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Contractors and Engineers Monthly

Vol. 44, No. 3 · MARCH, 1947 · $3 a Year, 25 Cents a Copy

Covering the Field

Foundation Construction
The usage peculiar to an industrial plant, plus a deep stratum of unsuitable material above bedrock, created foundation problems. Their solution with special Drilled-In Caissons is reported on this page and pictured on pages 48-49.

Highway Maintenance
Sound construction design eases a highway maintenance battle with tricky soils, snow, slides, and bad weather. A typical repair job is recounted on page 1.

Better Compaction on Fills
A plea for better dirt processing before rolling, and a discussion of the tools it requires, appear on page 2.

Concrete Paving
Uniform 8-inch concrete was set on a subbase-sand blanket for 7.4 miles of highway. Widened centers on expansion joints featured the job. Turn to page 7.

Driving New Tunnel
Read on page 17 how a conveyor system used between mucking machine and railroad saved time on a water-tunnel bore.

Roadside Development
Page 21 reports a new method of roadside seeding and mulching, with a crew of four and two special machines.
Listed on page 70 are steps in a plan to train technicians and educate the general public in roadside development.

Equipment Shop
State maintenance machines are serviced and repaired at the central garage described on page 23.

Bridge Construction
A versatile truck and winch feature the page 27 job—building a concrete bridge to replace one undermined by floods.
Page 74 covers an unusual application of the circular steel cell driven for pier foundations on a 4-span highway bridge.

Grading
The spectacular mountain-highway described on page 33 involved blasting granite cuts 100 feet deep. One fill was 226 feet deep.
Rubber-tired tractors and scrapers were shifted between two jobs 20 miles apart for eight fast hauls. See page 81.

County Road Work
A county which can slice its bonded debt and still maintain roads at peak standards merits the article space on page 44.

Bituminous Paving
Read on page 50 how a gravel sub-base was laid, covered with bituminous macadam, and topped with bituminous concrete.

New Concrete Dam
Construction of a concrete-arch dam, as described on page 54, will augment the water-power supply of a New England village.

Airport Construction
High-speed haul roads expedite the building of a 300-acre addition to San Francisco Municipal Airport. A 73-unit earth-hauling fleet was used. See page 60.

You will find "In This Issue" on page 4)

C. & E. M. Photo
This view shows U. S. 91, which Utah calls its "worst" highway, to be a smooth bituminous job with flat backslopes. Fast safe travel is easy here.

Maintenance Crews Widen State Roads

Highway Maintenance in Utah Is Combination of Construction and Repair With Good Management

✦ OF the mountainous states in America, Utah has one of the top-ranking highway systems. Yet its 84,900-square-mile area contains some of the most rugged topography of the west. And maintenance of its highway system is a battle with tricky soils, snow, slides, and bad weather.

The state has soils with up to 17 per cent of destructive salts. Sodium sulphite in those soils will eat concrete through to the reinforcing bars long before the concrete has outlived its usefulness. The state has high-swelling soil and earth with little bearing value. Some of the "fattest" clay in the nation

(*Continued on page* 65)

Foundation Columns Are Anchored in Rock

Drilled-In Caissons Take Heavy Building Loads to Bedrock 145 Feet Below Ground Level in New York

By WILLIAM H. QUIRK,
Eastern Editor

(*Photos on pages 48 and 49*)

✦ WITH bedrock along the East River Drive in New York City varying from 60 to 145 feet below street level, the problem of constructing a suitable foundation for an industrial building was solved by the use of Drilled-In Caissons. These caissons, which will take loads up to 1,100 tons each, consist of open-end 30-inch steel cylinders driven to rock. They are then excavated and within them are placed steel H-beam cores socketed in bedrock and embedded in concrete.

When ground clearing for a new housing project on New York's lower East Side got under way last spring, an industrial plant located on that site was forced to build new quarters. Land for the new building was acquired in the midtown area, bordering on the East River Drive, and some old structures had to be razed.

The industrial usage peculiar to this plant created a foundation problem. The ground floor in the new building as well as the next two floors above are to be used for trucking. Ramps will provide access to the upper floors. The trucks are heavy, and long spans are necessary to provide for sufficient maneuvering; heavy column loads will be the result.

To provide ample space for loading facilities, three 60-foot clear spans were designed across the center of the long side of the plant. The spans were subdivided into three 20-foot lanes, each provided with a loading dock to accommodate a line of trucks. The building will have four stories and a penthouse. A sprinkler system will be provided, requiring five 9,000-gallon pressure tanks on the roof which will add to the dead-weight loading.

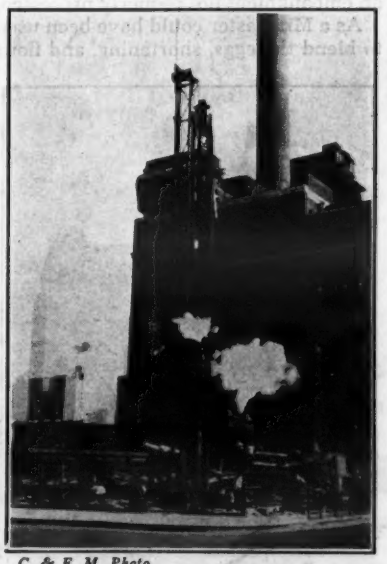
The combination of heavy loads, wide spans, and a deep stratum of unsuitable foundation material before rock was reached, resulted in the selection of Drilled-In Caissons for the foundation by the architect who designed the building. The foundation was constructed by Spencer, White & Prentis, Inc., of New York City and its affiliate, the Drilled-In Caisson Corp., with headquarters also in New York. The latter holds a patent on this type of foundation, which is designed to provide maximum foundation support at minimum cost and great speed.

Work on the foundation started late in April, and despite the prevailing delays in getting material, especially steel H-beams for the caisson cores, the job was finished by September. It is expected that the building will be completed early this year.

Heavy Design

The heaviest loads at the center of the building are carried by forty caissons laid out in one direction with five rows having spans of 60, 60, 60, and 28 feet respectively. In the other direction the two end spans are 34 feet 8 inches, with five intermediate spans of 24 feet 6 inches; thus a 40-caisson grid is formed, five rows by eight rows. The caissons are cylindrical ½-inch-thick shells, 30 inches in diameter, made from cold-rolled spiral-welded steel. They came in 70-foot lengths, weighing 5½ tons.

(*Continued on page* 85)



C. & E. M. Photo
Tuba Steel piles for the outer edges of the Spencer, White & Prentis foundation were driven by a Vulcan No. 1 hammer in 50-foot steel leads on this Marion crane with a 55-foot boom.

ARBA 1947 Convention

Prospects for highway construction in 1947 are more important than they have been at any time in the nation's history, delegates to the 44th Annual Convention of the American Road Builders' Association were told at the Palmer House in Chicago, February 17-20, 1947.

More than 2,000 contractors, highway engineers, manufacturers, and civic officials interested in the future of America's highway system heard Commissioner of Public Roads Thomas H. MacDonald's message. He said, in part: "Never before in the history of the nation has the need for improvement and expansion of our highway system been so urgent. The enormous volumes of traffic crowding our main rural roads and city streets reflect more accurately than any other index this demand for adequate highway facilities to accommodate the traveling public." The prepared message was read by Deputy Commissioner H. E. Hilts of the Public Roads Administration.

Honorable Paul Cunningham, Chairman of the Subcommittee on Roads of the House of Representatives, echoed Mr. MacDonald's sentiments and pointed out that the country is paying and will continue to pay for good roads. Citing the need for better, safer highways, Cunningham pointed out that the maintenance of highways is becoming big state business all over the country.

J. T. Callaway of the Goodyear Tire & Rubber Co. of Chicago was named President of the ARBA for 1947. He succeeds James J. Skelly of Media, Pa., who has headed the organization for the past two years. Paul B. Reinhold of Pittsburgh was named Vice President of the Northeastern District; Charles W. Smith was named Vice President of the Southern District; W. A. Roberts from Milwaukee becomes Vice President of the Central District; and Robert A. Allen of Carson City, Nev., was re-elected Vice President of the Western District.

Better Compaction Is Possible on Fills

Proper Mixing of Earth And Water Held Equally Important With Rolling; Simple Rules Urged

By RAYMOND P. DAY,
Western Editor

✦ LET'S face it. In the construction business today we have soil technicians who don't even apply good soil mechanics. Public money is being spent on bad fills in some cases, because these boys are writing construction specifications and directing the placement of embankment lifts.

To look at a few of their jobs, you would think the science of soil mechanics a matter of learned obfuscation, meaningless effort, and forty-five different kinds of rollers, more or less. Sooner or later you yearn to remind them that rolling is not all that matters in a fill; and that the density cards the laboratory returns are not always what the gentlemen from the public relations department would have one believe!

How about proper processing of this dirt before it's rolled? Are we going to let that all-important step be neglected, forgotten?

Blending Equipment Needed

The tools and equipment for conditioning soil properly and blending its particles with optimum moisture have come primarily from an agricultural process, tilling. Probably the most commonly used equipment—though there are plenty of circa 1946 jobs without even this primitive instrument—is the scarifier. I have seen otherwise good engineers in a frenzy of delight to have their job equipped with a "scratcher", as the hard-hatted gentry dub these rigs.

But at best, the scarifier is inadequate and improper to use on any large embankment. It is absolutely impossible to obtain a uniform distribution of moisture in certain types of soil when the scarifier is all that is used. It is an instrument which has to make repeated trips to accomplish its result; it multiplies trial and error.

Using a scarifier on an earth embankment is like mixing a batch of cake by running your finger three times through the batter and tossing it into the oven. You would have nodules of raw flour, clots of egg yolk, and knots of baking powder in such an experiment. The cake would be a mess. So is an embankment not properly processed.

As a Mixmaster could have been used to blend the eggs, shortening, and flour for the cake, so it is possible and important to obtain equipment which can pulverize and blend the soil and moisture to a uniform mix. After a rain, the same machine ought to aerate a soggy fill in a few hours. It takes days with a scarifier. When engineers and designers demand soil compaction as hard as Kelsey's fist, the business of proper conditioning and uniform moisture distribution becomes vitally important.

Surplus moisture is detrimental in processing a high-density embankment, and for that reason the processing equipment should readily be able to control the moisture below, rather than above, the optimum content. Only a thorough mixing will do that. An earth fill processed to its maximum density prohibits the use of surplus moisture, of course, but it is also axiomatic that the progressive use of surplus water will definitely create an unstable, dangerous embankment. This is especially true where the combination of a sheepsfoot and pneumatic rubber-tire roller is used. The pneumatic tires will suck the water up to the surface in almost all soils.

This earth, processed by a "scratcher," is full of lumps and clods. A roller attempting to compact this to specified density is at a disadvantage, time is wasted, and proper compaction difficult to achieve.

In the highway program ahead, new alignments and relocation of many routes will necessitate many cuts and fills. The material going into the fills and its compaction will determine the serviceability and length of life of the pavement it carries. The 70-foot fill shown here required 250,000 yards.

Specifications in Error

Many agencies have tried to make use of the latest available processing tools by stating, in their improved specifications, that they be brought to the job. But usually they have insisted merely on different rollers and different combinations of rollers.

Moreover, that old bugbear, generalized specifications, remains. These specifications get tighter and tighter for the contractor, in a sense, by demanding per cents of compaction very close to the maximum. But they leave the selection of processing equipment to chance, or to the opinion of a resident engineer who goes by precedent and remembers that the last job he was on used a scarifier.

Today, for example, there are many specifications on embankments which require a minimum number of passes with a roller of a certain type and weight. Beyond that, any rolling necessary to obtain the desired density is paid for under a separate item. But much of that rolling is wasted.

Most of the time the foreman or inspector motions for the roller before the moisture is all distributed. With the scarifier accomplishing little in the way of blending, preliminary passes with the roller are often utilized for conditioning rather than compaction. Extra rolling is then thought necessary, at extra cost to you and you and you.

Some specifications shy away from methods. They demand "at least 95 per cent of maximum density in accordance with AASHO method T-99-38" and let it go at that. Now in many cases it happens that neither the contractor nor the inspection force is smart enough to determine in advance exactly the amount of rolling to get 95 per cent. The result is a high bid to cover the risk.

Assume that a contractor decides to place an unbalanced bid for extra rolling, and gets the job with the extra rolling price far above what is normally considered a fair cost. Suppose this happens on a job composed predominantly of plastic material. It is well-nigh impossible to process this type of soil with a scarifier so that the moisture distribution will be uniform. Nor will there be much effort to obtain preconditioning on this job, because the extra rolling will be profitable to the contractor.

No resident engineer or inspector can successfully establish that the contractor failed to make an effort to obtain uniform moisture distribution, since the specifications did not demand any certain type of adequate processing machine. And even had a scarifier made seven or eight passes, it would still have been necessary to increase the rolling.

What is most important of all, the unsatisfactory blending of soil and moisture in advance of rolling will prevent *any rolling equipment from delivering its maximum results.*

Suggested Specification Change

In order to correct this unsatisfactory condition on embankments, the specifications should be written for the particular job. They should be clear, concise, and to the point. They should name an approved type of earth-processing equipment more in line with the great fleets of late-model machines for hauling and grading earth.

If an engineer would like to have a road-mix machine such as a Seaman Pulvi-Mixer, a Gardner or a Wood Roadmixer, an Ariens Aggmixer, or one of the new P&H One-Pass Stabilizers on his job, why can't he say so in his specifications? Or if politics interferes, he can always obtain a brochure of mechanical specifications and write his own around them, though this devious process fools nobody but himself.

New embankment specifications should call for processing equipment which can obtain the uniform moisture distribution with the minimum number of passes. And make no mistake, *the number of passes should be specified.* There are those who can testify to this; ask almost any old cat skinner. The new embankment rules should say that immediately after the soil has been preconditioned it should be rolled by a *specified* number of passes with a sheepsfoot, a pneumatic, or a vibratory roller. This number of passes should be the minimum to get the desired densities. In case that doesn't do it in a few places, a provision should be written into the contract to pay the contractor an extra sum for extra rolling.

This close-up of the mixing tines of a Seaman Pulvi-Mixer shows how the earth is turned, battered, and blended at high speed. Road-mix machines, pulled by a light wheel tractor, can speed up proper soil processing!

This may shock some of those learned gentlemen who love to write all kinds of doubletalk into their specifications. But why not make just two bid items out of this thing—pay for rolling by the hour, and pay for water by the thousand gallons? Several state highway departments are right now proving how simple that can be.

This suggestion for specifications ought to improve the overall construction result. The improved moisture control would benefit the stability of the fill. Densities would be consistently high. It would be more economical from the conditioning and rolling standpoints, because it would lower moisture requirements to a minimum and do away with most processing equipment except for the one specified machine. The cost of the water and water wagon would be reduced.

The contractor would save money on the deal because the operating cost of the scarifier and its towing equipment could be reduced enormously. A scarifier generally requires the equivalent of a Caterpillar D6 or an Allis-Chalmers HD-10 for towing power, and it has to make six to ten passes to do the job. Most of the road-mix machines, for instance, will do a thorough job of blending in one pass—two at most in stubborn clay—and a rubber-tired tractor will tow it faster than a scarifier can travel behind the D6. The amount of rolling will be reduced substantially and the speed of construction increased.

Specific Case Cited

Let's take this thought out where the mud gobs are rolling around in the dust and see how it works in practice.

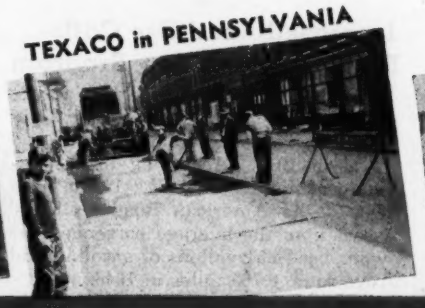
During construction at the Santa Monica, Calif., Municipal Airport, specifications required that all embankment and subgrade under and 5 feet beyond the runway and taxiway pavement should be compacted by four passes of a pneumatic roller, ballasted to 100 tons. Additional rolling was provided in case the densities in the upper 3 feet of subgrade were "not deemed satisfactory by the contracting officer". Additional rolling was bid at $0.05 per

(*Continued on page 93*)

This embankment was processed, before rolling, in one pass of a Seaman Pulvi-Mixer.

Laying 3½ miles of two-course Texaco Asphaltic Concrete pavement through the center of Bangor, Maine

TEXACO in MASSACHUSETTS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Potential Obstacles to Road Program

One of the most vital factors in our modern economy is transportation. Without it, modern industry is crippled; modern life breaks down. For interdependence is now woven into the pattern of our lives and the days of the self-sufficient family, living off the land and going to market once or twice a year, are a part of the past.

Our highways are an essential part of our transportation system. As a nation, we have invested many millions in bringing them to their present standards. We have tried to protect that investment by maintenance and reconstruction as necessary. But the fact remains that our present highway system is not geared even to present-day needs; and it is totally inadequate for traffic conditions which are anticipated for the future.

At hearings held on the Federal-Aid Highway Act of 1944, ample evidence was presented that our highways are badly in need of reconstruction and general improvement, that thousands of bridges need to be rebuilt, and that safety demands the construction of many grade-separation structures. Upon these needs was predicated the Act, which provided $500,000,000 a year for the first three post-war years, to be matched by the states.

Shortages of labor and material, restrictions, strikes, and uncertainties made it impossible to accomplish, during the first post-war year, as much of the highway program as we had planned and hoped. Yet under the Act as passed, sums appropriated but not used by the states must revert to the U. S. Treasury. Thus many states, which lagged behind in their construction schedules, would forfeit funds that had been apportioned to them.

Not only would this be very damaging to the highway program; it would be unfair as well. The states were not responsible for the many major disruptions in basic industries during reconversion from war to peacetime production. Strikes, and shortages both in men and materials, have skyrocketed costs. These, in turn, have delayed highway construction, since in many instances highway officials have been reluctant to award contracts for road work at the highly inflated prevailing prices.

Consequently, the American Association of State Highway Officials passed a resolution at its 1946 convention urging an extension of time for the availability of funds appropriated by Congress under the Federal-Aid Highway Act of 1944.

By making such an extension of funds, Congress can prevent the states from losing any portion of the appropriated funds they have not spent by June 30, 1947. A 12-month extension for this and the following two years covered by the Act will enable the states to carry on their planned programs. And the purpose of the Act, which is to build needed roads, can be realized.

Another facet of the whole legislative problem is this: the Federal-Aid funds provided are derived from (or at least offset by) the Federal 1½-cent-per-gallon gasoline tax. If this revenue were not available, funds for the road program would have to come from some other form of taxation, or not be forthcoming at all. Yet despite this obvious fact, well organized pressure groups are strongly urging Congress to repeal the Federal gas tax.

Now, no user of the nation's highways, if he has to choose between paying a tax or putting up with an outmoded system of highways, will hesitate over which decision to make. But he has to recognize his choices. The problem seems to be in bringing the general public to the realization that good highways cost money, and that the funds for road building logically come from highway users.

Furthermore, revenue for the states' share in the Federal-Aid program, and for their own varied highway department activities, is derived from the state tax on gasoline and motor vehicles. These same pressure groups are advocating a decrease in state taxes, in spite of the fact that such action would greatly curtail the states' highway programs. This dangerous and biased thinking certainly cannot be representative of the wishes of the general public which is clamoring for more, better, and safer highways. And it is placing our entire road program in jeopardy.

It is up to us who know the facts to see to it that these small but articulate pressure groups do not lead the Congress and the various state legislatures into hasty action, in an effort to appease the voters by tax decreases. Economy we most certainly want. But real—not false—economy. We feel sure that the Congress, the state legislatures, and the general public, when fully informed of our highway needs, will back the necessary measures to support and finance an adequate consistent road-building program.

Engineers Asked to Aid In Restoring Libraries

A new appeal to engineers to help restore war-damaged or destroyed technical libraries in Europe and Asia has been issued by the Committee on International Relations of the Engineers Joint Council. Both money for the purchase of new books, and selected used technical books and periodicals are needed.

Checks should be sent to Joseph Pope, Chairman of the Book Commission, Engineers Joint Council, 29 W. 39th St., New York 18, N. Y. Money received in this way will be used to fill specified needs of the damaged libraries.

Those having books they wish to contribute should first send a list of authors and titles to the same address. Full instructions will then be sent to the contributors as to what procedure they should follow. And they will be given special bookplates for their names.

The shipments overseas are made through the American Book Center for War Devastated Libraries, Inc., Washington, D. C., through an arrangement with the engineers. Since the campaign started about a year ago, some 20,000 items have been accepted. These include 4,592 engineering books and 9,526 periodical items.

Increased Road Use Calls For Large Highway Program

The need for an accelerated highway program has again been pointed out with the release of figures on road travel in 1946. According to the estimate of James J. Skelly, 1946 President of the American Road Builders' Association, the average passenger-car owner used 651 gallons of gasoline and drove some 9,765 miles in 1946.

In commenting upon this, Mr. Skelly said, "Increasing gasoline consumption shows that the nation is geared to a highway pattern of living. A car-traveling public is depending more and more upon the highway for business trips and recreational travel. . . .

"With all of us driving more, construction and maintenance of our highways is a national 'must'. Highways must be made safe and adequate for increasing numbers of drivers."

Although there were fewer cars and trucks registered in 1946 than in 1941, the nation's vehicles used 1,000,000,000 gallons more gasoline than in the peak pre-war year. In 1946, highway gasoline consumption rose to 25,200,000,000 gallons for the nation.

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New Exams Set—Navy CEC

A new examination will be held in May for civil engineers seeking appointment as lieutenants, junior grade, in the Navy Civil Engineer Corps, it has been announced by the Bureau of Yards and Docks. The new test was scheduled after it became apparent that many applicants had failed to receive adequate notice for the test in February.

Candidates must be between 22 and 30 years old; must be graduates of an accredited engineering college or university; must have had three years of professional experience in engineering, or related active military service; and must be citizens of the United States. Those who will have completed the three years of experience or service by July 1, 1947, qualify as candidates.

The examination, which will be designed to test general engineering knowledge, will require two days. Applicants can secure full details from the Naval Officer Procurement office in their area.

ASCE Elects Officers

The American Society of Civil Engineers installed its officers for 1947 at its 94th Annual Meeting in the Hotel Commodore, New York City. Elected President was Edgar M. Hastings of Richmond, Va., Chief Engineer of the Richmond, Fredericksburg & Potomac Railroad Co.

The following new Vice Presidents will serve in 1947: Gail A. Hathaway, Special Assistant to the Chief of Engineers, U. S. A., Washington, D. C.; and Professor Ralph B. Wiley, Head of the Civil Engineering school, Purdue University.

Price Trends in Highway Construction

Prepared by Public Roads Administration

Year	Common Excavation		Concrete Pavement		Structures				
					Bid Price				
	Bid Price Cu. Yd.	Sub-Index	Bid Price Sq. Yd.	Sub-Index	Reinforcing Steel—Lb.	Structural Steel Lb.	Structural Concrete Cu. Yd.	Sub-Index	Composite Mile Index
1922	$0.40	114.5	$2.28	102.7	$0.050	$0.074	$20.18	95.1	105.8
1923	.47	133.3	2.43	109.5	.057	.078	23.37	108.6	117.9
1924	.43	122.2	2.40	108.3	.057	.077	22.91	107.2	113.1
1925	.39	110.0	2.36	106.4	.056	.067	22.53	103.9	107.5
1926	.36	103.7	2.29	103.1	.053	.074	22.76	103.7	103.4
1927	.35	100.3	2.29	103.3	.051	.071	22.65	101.5	101.9
1928	.34	96.0	2.10	94.5	.049	.067	21.22	96.1	95.3
1929	.32	90.0	2.05	92.7	.048	.059	21.38	95.0	92.1
1930	.30	86.3	1.86	84.1	.045	.061	20.08	89.4	85.7
1931	.27	77.6	1.68	75.6	.040	.054	18.02	79.9	76.8
1932	.18	55.0	1.44	64.8	.034	.046	15.33	68.0	61.0
1933	.26	74.0	1.67	75.1	.038	.046	16.15	72.2	76.7
1934	.29	83.3	1.90	85.8	.043	.053	17.73	80.8	84.0
1935	.26	73.3	1.90	85.6	.044	.052	17.78	81.5	80.6
1936	.26	74.8	1.91	86.0	.046	.060	20.25	90.0	82.9
1937	.24	69.0	1.89	85.1	.048	.066	19.76	91.5	79.4
1938	.21	59.8	1.72	77.5	.045	.063	19.06	87.2	72.8
1939	.21	59.8	1.73	77.8	.044	.059	19.13	85.9	72.6
1940	.21	59.2	1.68	75.6	.045	.063	19.17	87.6	71.6
1941	.24	69.2	1.89	85.2	.054	.076	21.44	100.8	81.8
1942	.37	105.5	2.44	109.7	.065	.090	26.16	122.3	109.9
1943	.44	125.6	2.78	125.7	.067	.095	30.19	134.4	126.9
1944	.38	108.3	2.54	114.3	.064	.089	31.94	136.5	115.5
1945	.36	102.6	2.48	111.8	.062	.077	31.62	132.5	111.7
1946									
1st Qtr.	.37	105.4	2.66	119.9	.067	.105	35.44	150.1	119.3
2nd "	.34	96.9	2.63	118.6	.072	.115	37.01	158.8	117.0
3rd "	.35	99.7	2.75	124.0	.076	.115	39.83	168.6	122.1
4th "	.37	105.4	3.08	138.8	.083	.118	42.86	181.2	133.3
Average	.36	101.9	2.78	125.3	.075	.113	38.79	164.7	122.9
Base 1925-29	0.35	100.0	2.22	100.0	0.052	0.067	22.15	100.0	100.0

Note: During the years 1925-29 inclusive the average mile involved the movement of 17,491 cubic yards of earth and similar materials, 3,726 square yards of paving, 16,000 pounds reinforcing steel, 4,325 pounds structural steel, and 68 cubic yards of structural concrete. These quantities form the base for the composite mile.

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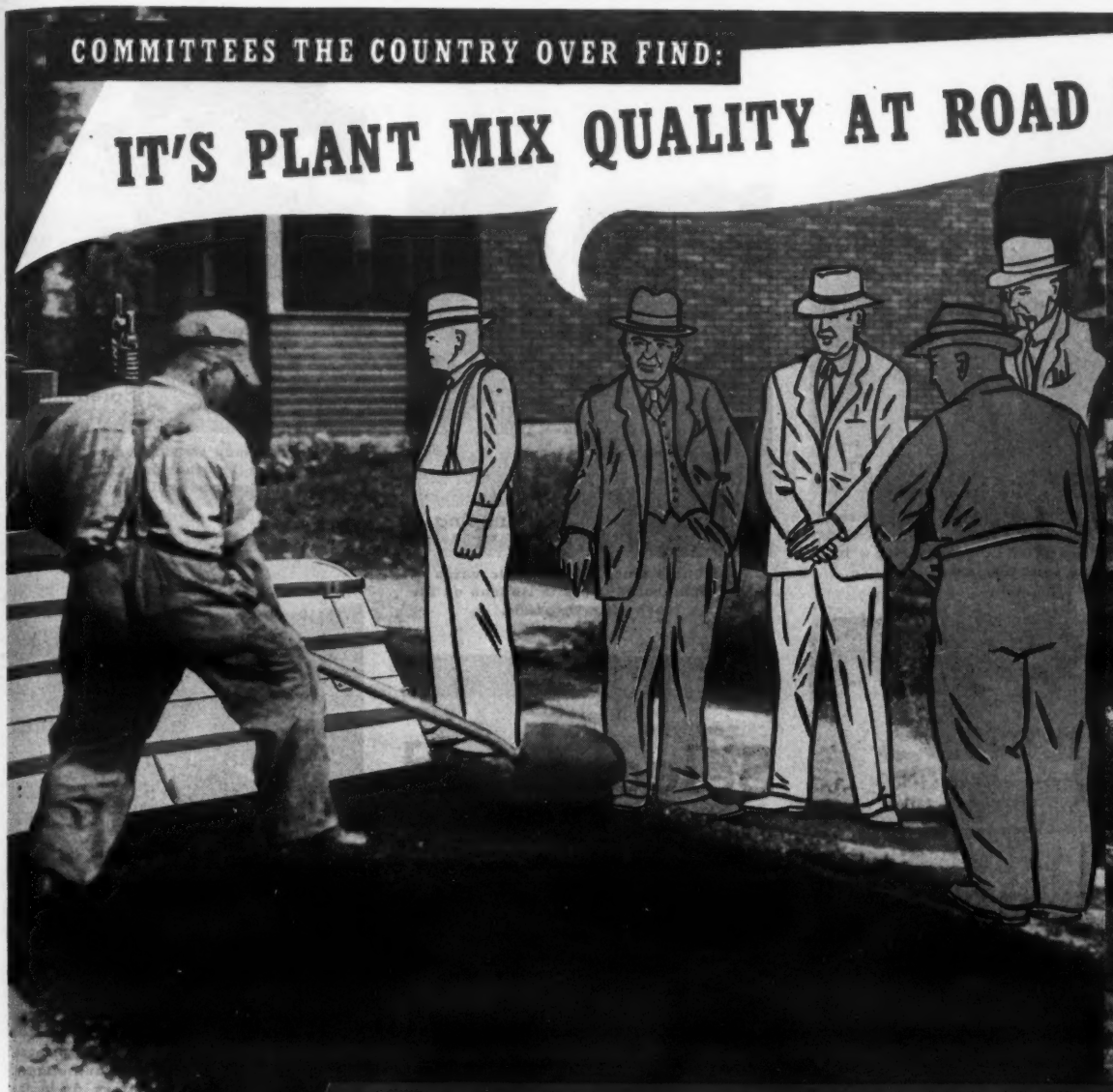
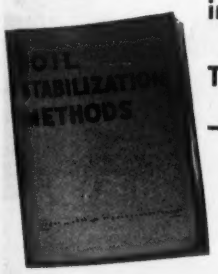


The SEAMAN MIXER

ENGINEERS and CONTRACTORS recognize today that with the SEAMAN MIXER there are no uncertainties and no variables in the mix produced. In thoroughness, in control of voids and in high daily production the work of the SEAMAN meets the strictest specifications; — no better mix can be obtained with any equipment of any type.

But more, the SEAMAN can control certain inescapable conditions that often occur in road construction. For example, if pit run aggregate is used in bituminous construction, frequently the fines are found in one area of the treatment and coarse material in another. By the application of more oil to the fines, — less to the coarse, — two passes of the SEAMAN compensate for the irregularity and prevent "rich" or "lean" spots from appearing. Furthermore, the "carry" of mixed materials within the mixing hood averages the mix and in itself promotes uniformity.

These and many other advantages are SEAMAN characteristics, — all at the low-cost that prevails in road-mix operation.



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SEAMAN MOTORS, INC.

Milwaukee 3, Wisconsin

Select-Sand Blanket Under New Pavement

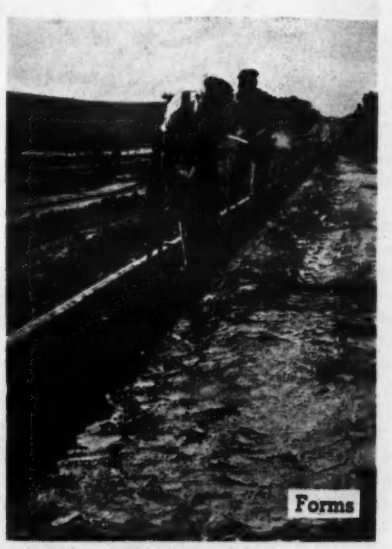
(C. & E. M. Photos)

On the Booth & Olson contract for paving 7.4 miles of U. S. 77 in Nebraska, select sand was used as an insulating course on the subgrade. This Koehring 301 dragline is loading native sand for this special blanket. The large pile of material is overburden, 2 to 6 feet of which was removed to reach suitable sand deposits.

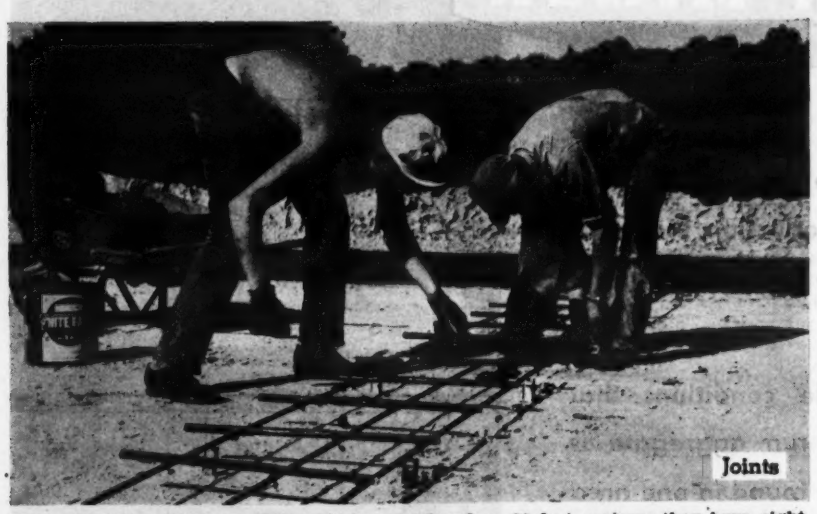
A Ford dump truck with 4 cubic yards of select sand aboard deposits its load on the black clay subgrade.

The piles of sand were spread by a fresno pulled by an International tractor. The sand blanket was laid 6 inches deep.

Personnel for Booth & Olson of Sioux City, Iowa, contractor for this 7.4-mile Nebraska paving project, included (left to right) Finishing Foreman George De Jong, Paving Foreman L. C. Burris, and General Superintendent Don Allen.



Following compaction of the sand blanket, the steel Metaforms were set and aligned. Here two of the form-setters drive the three steel pins in each section to hold the forms securely during the pour.



The contraction joints on this project were placed on 20-foot centers; they have eight dowels, 26 inches long, of ¾-inch round steel in each 11-foot joint. Here workers apply black grease to the dowels to keep the concrete from sticking.

After 5½ inches of concrete had been poured for approximately 40 feet, 6 x 12-inch wire-mesh reinforcing was placed. Then the Koehring Twinbatch paver and Jaeger spreader shown here moved back to pour and spread the remaining 2½ inches of concrete, for a total pavement thickness of 8 inches.

Special crews working from a movable bridge cut the slots for the contraction joints, placed the ⅜ x 2½-inch asphaltic mastic strip, and finished the edges.

After finishing and dressing, Cecure membrane curing compound was applied. A Curtis compressor driven by an International diesel engine furnished power for the spray.

Select-Sand Blanket Under New Pavement

Uniform 8-inch Concrete With Expansion Joints On 500-Foot Centers Set On Special Insulation

✦ ON U. S. 77 the contracting firm of Booth & Olson of Sioux City has paced what may be an improved trend in Nebraska road building. On its 7.4-mile contract, it set 22-foot Class 46-B concrete paving 8 inches thick on a 6-inch insulating course of native sand, selected from near-by deposits. Expansion joints widened to 500-foot centers constituted another feature of the Nebraska Bureau of Highways contract. Construction of shoulders 8 feet wide on both sides of the new highway followed the laying of pavement.

Dogged by wet weather, the job kept on schedule only because of excellent organization and enough experienced key men to take advantage of breaks when they developed. With only 125 working days from August 3, 1946, in which to finish the $378,000 job, the Booth & Olson firm drove ahead as rapidly as possible.

The new road replaces a stabilized base course and armor coat constructed in 1938 on black organic subgrade. Subgrade and pavement failures had made the road rough and dangerous for the automobile and truck traffic between Fremont and Lincoln. This was especially true south of Wahoo, where the job was located. Design engineers of the Nebraska Bureau of Highways hope to correct the bad subgrade condition by insulating the new highway with 6 inches of select-sand blanket.

Widened centers on expansion joints will reduce joint-pumping maintenance if the sand does not entirely correct that situation. A 1 13/16-inch crown will drain the pavement surface, and 6 x 12-inch wire reinforcing mesh 2½ inches under the surface of the new concrete will give it flexural strength. The new road is located about 50 per cent over the old pavement and 50 per cent on new location.

Pervious Sand Blanket

Dirt work was done by Booth & Olson's fleet of tractor equipment and the grade compacted to survey hubs. However, in some of the cut sections where extremely heavy, dense black and red clays were found, it was necessary to go in with a Caterpillar No. 12 motor grader and dress the subgrade down. Two men with a string line and rule worked with this grader.

Extensive winter explorations of native material by the Nebraska Bureau of Highways located the sand deposits under what appeared to be solid hills. Borings made by key personnel during the winter of 1945-46 unearthed pits of very fine sand, covered with from 2 to 6 feet of overburden. Laboratory tests and practical consideration of the sand indicated that it was suitable for this experiment. Its use was incorporated in the specifications, and a sand blanket was drawn on the contract plans.

Booth & Olson moved a Koehring Model 301 dragline with a ¾-yard Page bucket to the first pit. Heavy overburden 6 feet deep on this first pit delayed loading for a few days, but the refuse material was cast aside by the dragline. The Koehring machine kept a fleet of seven GMC and Ford dump trucks busy on a 1½-mile haul. The trucks were rented in the vicinity on an hourly basis, and made from four to five loads an hour on the short haul.

The clay subgrade was sprinkled very lightly just ahead of the dump trucks. The volume of the sand blanket was calculated by a field spotter and dump man, who figured the number of loads per station about 2 per cent strong. If any excess sand was put in it was moved on ahead or thrown out by a power fine-grader later. The sand was dumped in a windrow in the center of the road. The haul road for trucks from the pit to the dump was maintained on one of the future shoulders by the same Caterpillar motor grader that adjusted the clay subgrade ahead.

Compaction of the clay subgrade ahead of the sand blanket was carried on as part of the placing of insulating material. An International wheel tractor, with its rear wheels widened from 11½ to 18 inches and filled with solid concrete for weight, was used on the clay. When the sand was leveled off,

(*Continued on next page*)

C. & E. M. Photo

A Ford truck is about to leave the Johnson batching bins set up by Booth & Olson for its concrete-paving job near Wahoo, Nebr. The Koehring 604 clamshell kept the 30-ton bins loaded with sand and rock, and unloaded railroad cars.

ROCKFORD

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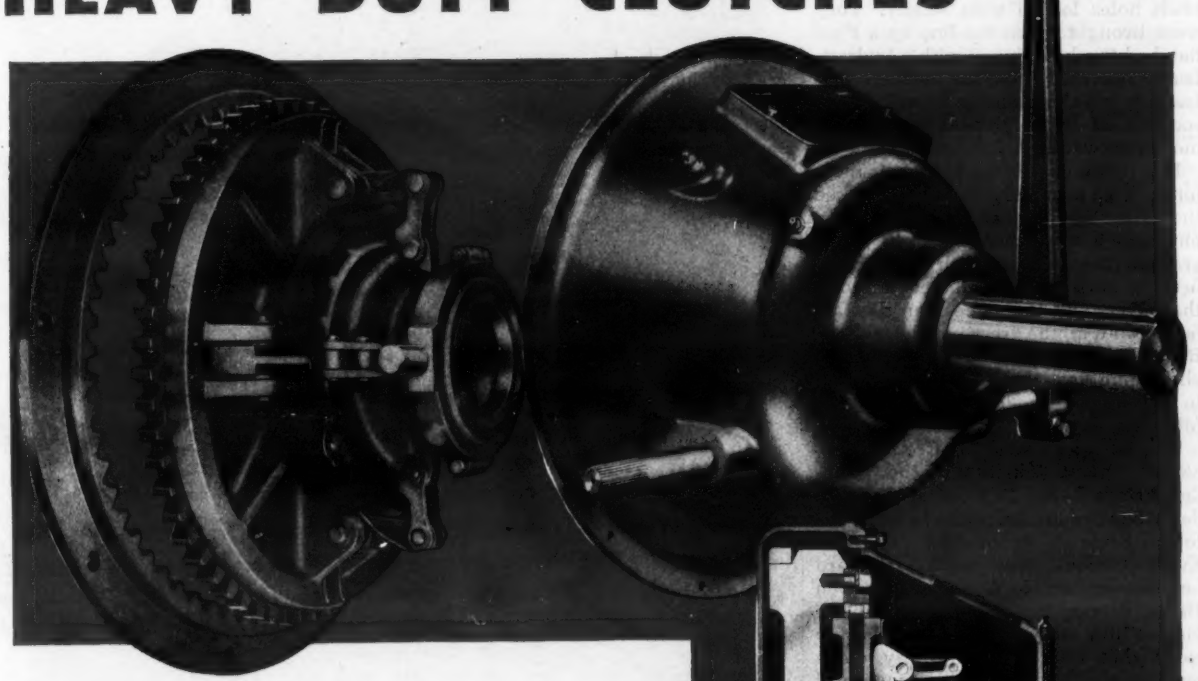

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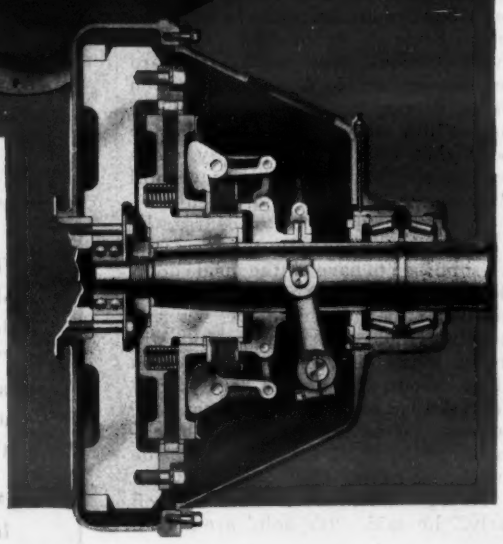

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Gives dimensions, capacity tables and complete specifications. Suggests typical applications and makes helpful recommendations for planning efficient power take-off drives.

ROCKFORD CLUTCH DIVISION BORG-WARNER

314 Catherine Street, Rockford, Illinois, U.S.A.

Select-Sand Blanket Under New Pavement

(*Continued from preceding page*)

another International wheel tractor with a fresno worked out any inequalities of material. Several passes of a Caterpillar No. 212 motor grader over this sand blanket smoothed it up sufficiently for compaction work.

The pervious blanket was compacted by the passage of water-tank trucks and the International roller wheels. Sprinkling was done with caution. Just enough water to reach through the 6-inch lift was put on. The contractor steered away from extensive watering which might make the clay soggy underneath.

Preliminary Form Work

After compaction of the sand blanket, a fairly large labor force set and lined up some 3,300 linear feet of steel paving Metaforms. These were all in excellent condition. Because the sand blanket was unstable at the edges, all form-trench excavation and tamping had to be done by hand. Two laborers on each side of the road were able to shovel out the form trench and keep ahead of paving machines, although these hit a peak performance record of 2,133 feet in a 12-hour run.

The steel forms weighed 190 pounds per section (and a little more with the latch holes loaded with sand!). They were brought up on the line by a Ford flat-bed truck equipped with a hydraulically operated boom for loading. Unloading was done simply by rolling the sections off on the ground as the truck moved forward.

Five men were used to set these forms. Two men and a line boss checked them for alignment, and drove the steel pins which stake them securely to the ground. Two laborers with buckets and brushes oiled by hand all steel ahead of the paver, and the same men doubled back to put all the grease on dowel bars. Regardless of how far the paver moved ahead one day, these form setters had to pick up and set all the form work the following day.

The job was visited for CONTRACTORS AND ENGINEERS MONTHLY on the Saturday before Labor Day—of all times, a day when production might be expected to lag. Such was definitely not the case. Every machine was moving forward hell-for-leather. In the early afternoon Dame Rumor began to circulate the vicious little story that work would stop early that afternoon, and stay down over Sunday and the holidays: wishful thinking, perhaps, as rumor often is.

On these paving jobs, of course, the truck drivers are usually the boys who are supposed to have all the inside dope. Most of them are wishful clairvoyants, and claim they can read the superintendent's mind. As any paving stiff knows, it has been this way for years. Along about 2 p.m. one long, lanky Nebraska lad could no longer stand the suspense. Crawling out of his batch-truck cab, he slunk over to fiery Clyde Burris, the paving boss.

"Hey, gimme the word on knockin' off early," he said. "It's goin' around all over the job that we're quittin' at 3 o'clock."

"You crawl back on that damned truck and work till I tell you to stop!" Burris bristled. "When it was rainin', you guys cried to get some overtime hours. Well, the sun's out now, and we'll work today all day, tomorrow all day, and maybe Monday!"

C. & E. M. Photo
These two men on the Booth & Olson job use a 6-inch fabric belt on the 8-inch concrete, to give the surface its final herringbone effect.

Development of Water Supply

A steady supply of water was needed for the paver, for watering the sand blanket, for sprinkling subgrades, and for continuously wetting the rock-aggregate piles at the concrete batching plant. The nearest dependable source was a large creek at the south end of the project. A 2½-inch steel pipe header with screwed joints was laid from this stream 3 miles north to the town of Ceresco. Steady pump pressure was maintained on the line. A by-pass valve was installed so that when no water was being drawn out of the line the Jaeger pumps would not tear themselves up.

A water-loading platform in Ceresco then served tank trucks for the paver, sprinkling wagons for the subgrade, and sprinkling hoses located at the concrete batch plant on the Northwestern Railroad spur siding in town. The one line was all that was laid. One grizzled old veteran of a thousand construction jobs, hired to lay steel pipe, was later assigned as subgrade foreman.

"It ain't no worse than the wartime Navy," he grinned, with the happy as-

(*Continued on next page*)

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The new ML 4 Athey MobiLoader is designed for digging — a sturdily-built unit that gets bigger loads. Its new heavy-duty digging bucket, fast, "Finger-Tip" hydraulic control, new better balanced "Caterpillar" Diesel Tractor mounting, all add up to bigger production and easier operation on your digging and loading jobs.

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"Finger-Tip" Control — A convenient lever gives operator complete and accurate command over the movement of the heavy-duty bucket. Easier operation, bigger production.

Athey ML4 MOBILOADER

Select-Sand Blanket Under New Pavement

(*Continued from preceding page*)

surance of that rare individual who can do a variety of things and do them well. "Hell, my boy was a diesel technician and the Navy put him to cookin' in a hospital!"

Machine Line-Up for Pouring

The first machine on the 22-foot-wide line of steel forms was a Buckeye Model 4FR-B Power Finegrader. Pulled ahead by twin steel cables, anchored 300 feet ahead to the forms, this machine rolled forward and trimmed the sand blanket to neat lines. It was operating about 340 feet ahead of the paver the day the job was visited, moving forward at an average rate of 250 feet an hour. One laborer with a shovel was removing the little ribbon of sand from inside the forms. He deposited this material on the outside steel base to prevent any concrete from sticking later on.

Excess material was deposited along a shoulder, and from time to time the Caterpillar No. 212 motor grader would dash around and blade this material down to maintain the haul road for sand trucks. The shoulder on which excess material was dumped, incidentally, was opposite the side where the paver was located.

Fine-grading by power equipment and the heavy line-up of paving and finishing machines caused Don Allen, Superintendent for Booth & Olson, to do extensive personal checking. The forms were set on sand, it will be recalled, and Allen calculated that sand might settle under the weight of equipment. If it did, the top of the pavement was certain to be lowered in relation to the sand subgrade.

Nebraska's specifications have an absolutely ironclad clause which says, in effect, "If you pour pavement for us that turns out to be ½ inch thin or over, we won't buy it. It's yours!" Pavement thicknesses are checked by state crews with core-cutting machines after the slab is in place. No amount of pleading, excuse-making, or legal action can get around the airtight English in Nebraska's specifications. And while ½ inch on an 8-inch pavement is good tolerance, Don Allen very carefully checked what was happening to his Metaforms when the heavy machines rolled across the top.

He found some settlement on the low side of a curve section, but not enough to render the Booth & Olson Co. gratis road builders. He continued this check from day to day, especially when sand from new pits was first brought in. He regarded settlement as one of the important dangers of the job—that and weather.

Behind the Buckeye Finegrader came the two laborers who set the contraction-joint dowel frames in place. The dowels were 26 inches long, made of ¾-inch round steel, and greased for 12 inches on the forward end. They were fabricated on three longitudinal pieces of ½-inch round steel, and supported on steel pins. These dowels were set in place, one section in each traffic lane, halfway through the pavement. Eight dowel bars were in each 11-foot frame. After they were set, the boys who oiled the forms applied heavy black grease to the dowels.

Every 500 feet, two special dowel frames for expansion joints were set. The dowel bars on expansion joints were 28 inches long, capped on the forward end. Grease was also applied. The expansion-joint material, 1-inch nonextruding fiber, was furnished by Ceco Steel Products Corp. in sheets 11 feet long and 7 inches wide. Two sheets of this material were supported with dowels on a special expansion-joint cage.

Pouring and Finishing

Booth & Olson used a 2-year-old Koehring 34-E Twinbatch paver with a Koehring bucket on a 30-foot boom. This machine was spotted on the opposite side of the pavement from the subgrade haul road. It was so situated that dump trucks did not have to cross the road to reach the job from the batch plant. The shoulder where the paver was located was not wide enough to allow batch or water-tank trucks to pass, generally, and considerable backing-in somewhat slowed the work from full capacity. Don Allen estimated that 2,400 feet in 12 hours would be almost 100 per cent of the potential in his machines, but the problem of access reduced this to 1,800 feet a few days.

It was this problem that was referred to earlier when we mentioned experienced key men capable of exploiting any "breaks of the game". Allen decided to have every private street in the town of Ceresco explored, with a view to using them for access. Farmers' roads, too, began to carry roaring Ford batch trucks hauling dry-batched concrete to the Koehring paver.

Mixing water was hauled from Ceresco by tanks mounted on Ford trucks. They used the shoulder behind the paver. About 250 feet of 2½-inch rubber hose from the paver drew water from the tanks. The mixer operator controlled the water content for about a 2-inch slump of concrete.

C. & E. M. Photo

From a shop-made bridge, finishers pull contraction-joint steel forms on the U. S. 77 job in Nebraska. They also trim up the joint with ¾-inch-radius edgers.

Batch trucks approached the paver

(*Continued on next page*)

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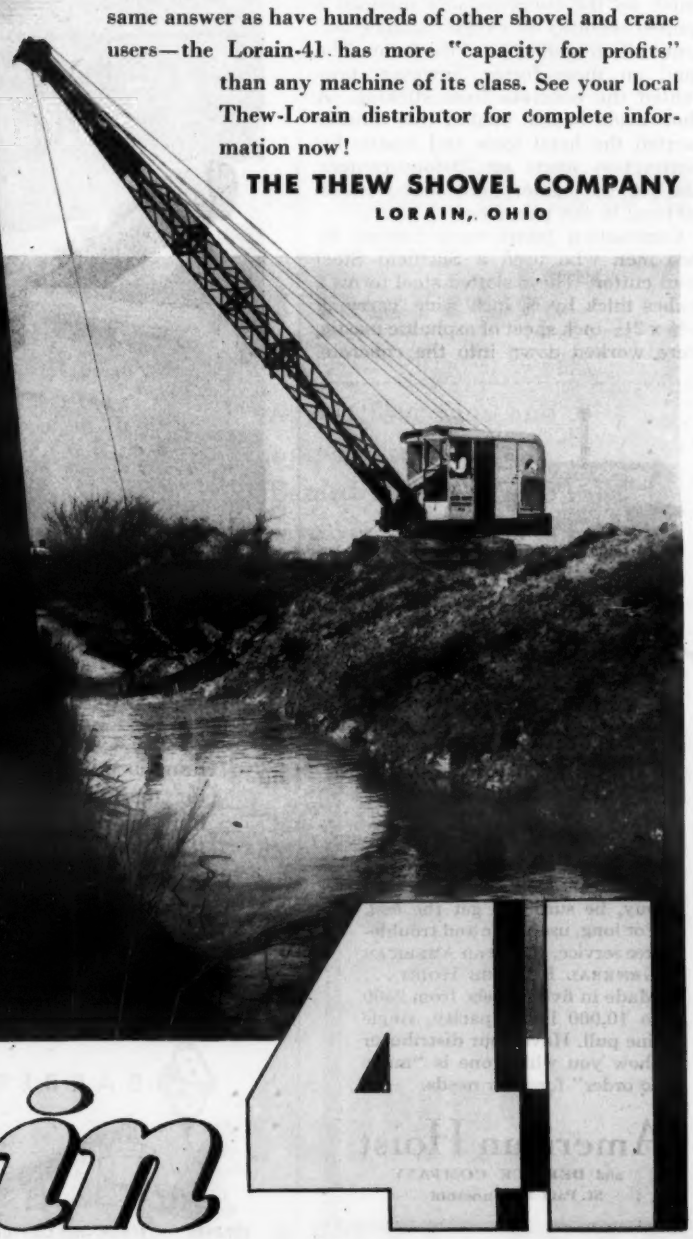

Thew Lorain 41

Select-Sand Blanket Under New Pavement

(*Continued from preceding page*)

from the forward, or subgrade, end. As a general rule they had to back in more than 100 feet. They dumped directly to the paver skip, while a spotter beat the truck bed with a heavy sledge hammer to dislodge the cement from the bottom of the batch. The exceptionally large dump throat and vertical position of the Koehring Twinbatch skip is designed for clean dumping into the first of two drums. Mixing time is 60 seconds.

The concrete was dumped in about three places across the subgrade, with no particular effort made to spread the mix. This was possible here because Booth & Olson followed the paver with a Jaeger concrete spreader. This machine has reversible worm distributors in front to move the concrete uniformly over the subgrade.

The slab was poured 5½ inches thick for approximately 40 feet. At that time a laborer came through and set a few horizontal steel supports on the concrete. Sections of wire-mesh reinforcement were then brought in by four men, who carried it from the right-of-way below the shoulder. This reinforcing was carefully placed. Then the paver and the Jaeger spreader moved back over the reinforcing mesh to place the other 2½ inches. Concrete vibration was done at the edge of the Metaforms by two Mall gasoline-engine-driven machines, operated by a vibrator man apiece on the rear of the spreader.

Directly behind the Jaeger machine was a Jaeger-Lakewood double-screed float finisher. This machine put the first finish on the concrete, and dumped a limited quantity of excess laitance and grout off on both sides of the forms. The sand on these forms, however, prevented the concrete from sticking. A shop-made bridge behind this finisher carried the hand tools and mastic for contraction joints on 20-foot centers, and for the center joint that went in midway in the pavement.

Contraction joints were formed by two men who used a Sheffield Steel joint cutter. These slotted steel forms 2 inches thick by ⅜ inch wide, carrying a ⅜ x 2½-inch sheet of asphaltic mastic, were worked down into the concrete. The center joint was formed by slotting the center of the pavement and setting a 10-foot strip of ⅜ x 2½-inch mastic.

Following this operation, a Koehring Longitudinal Finisher passed over the surface. Afterwards, two finishers using long-handled floats and straight-edges checked the pavement and corrected any irregularities in the surface. Finishers with 6-inch fabric belts then followed and put the final herringbone effect on the concrete.

A shop-made bridge carrying two more hand finishers came along, and the men pulled the steel forms off the contraction-joint mastic. This steel was washed off and carried on ahead. The rough edge around the mastic was then dressed by ⅜-inch-radius edgers. The slab edge at the steel forms was also dressed with edgers to prevent its spalling, and to improve its general appearance.

Cecure membrane curing compound was applied by a power spray from a shop-made bridge. An International diesel engine driving a Curtis Pneumatic compressor furnished power for operating the spray.

The day following the pour, the steel form pins were pulled by a crowbar puller, the forms were broken loose by a hand pry, and three laborers with hoes cleaned the steel. It was then moved on ahead for the next run; about 35 sections to the load were hauled.

Work on the shoulders was held up until most of the slab was poured. At that time Superintendent Don Allen moved trucks in and hauled the pervious material for this part of the work.

The Batch Plant

New Johnson batching bins for rock and sand, and a new Johnson bulk-cement plant, were located in the town of Ceresco on the railroad. One size of coarse aggregate was shipped in to the job from the George Kerford Quarry Co. at Atchison, Kans. Sand was shipped in by railroad from the Lyman Richeg Sand & Gravel Co. at Fremont, Nebr. Bulk cement came from the state of Nebraska; Ideal bulk portland cement from Superior and Ash Grove cement from Louisville were brought in to Ceresco in hopper-bottom cars and unloaded by a screw conveyor attached to the Johnson plant.

The mix called for 6 sacks of cement per cubic yard of concrete. A batch with a calculated yield of 1.384 cubic yards was used, with wet-batch weights as follows:

Coarse Aggregate	3,008 pounds
Sand	1,290 pounds
Cement	781 pounds
Water	377 pounds

The sand and rock were checked at the point of manufacture, and samples were run on all cars at the time they came in to Ceresco. The following table gives screen analyses of this material:

Sieve Size	Per Cent Retained (Rock)	Per Cent Retained (Sand)
1-inch	0-5	.....
¾-inch	0-20	.....
⅜-inch	50-80	.....
No. 4	95-100	5-40
No. 10	.....	35-55
No. 20	.....	50-80
No. 100	.....	95-100

(Total passing No. 200, 3 per cent sand)

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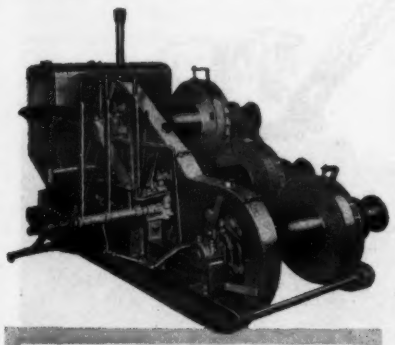

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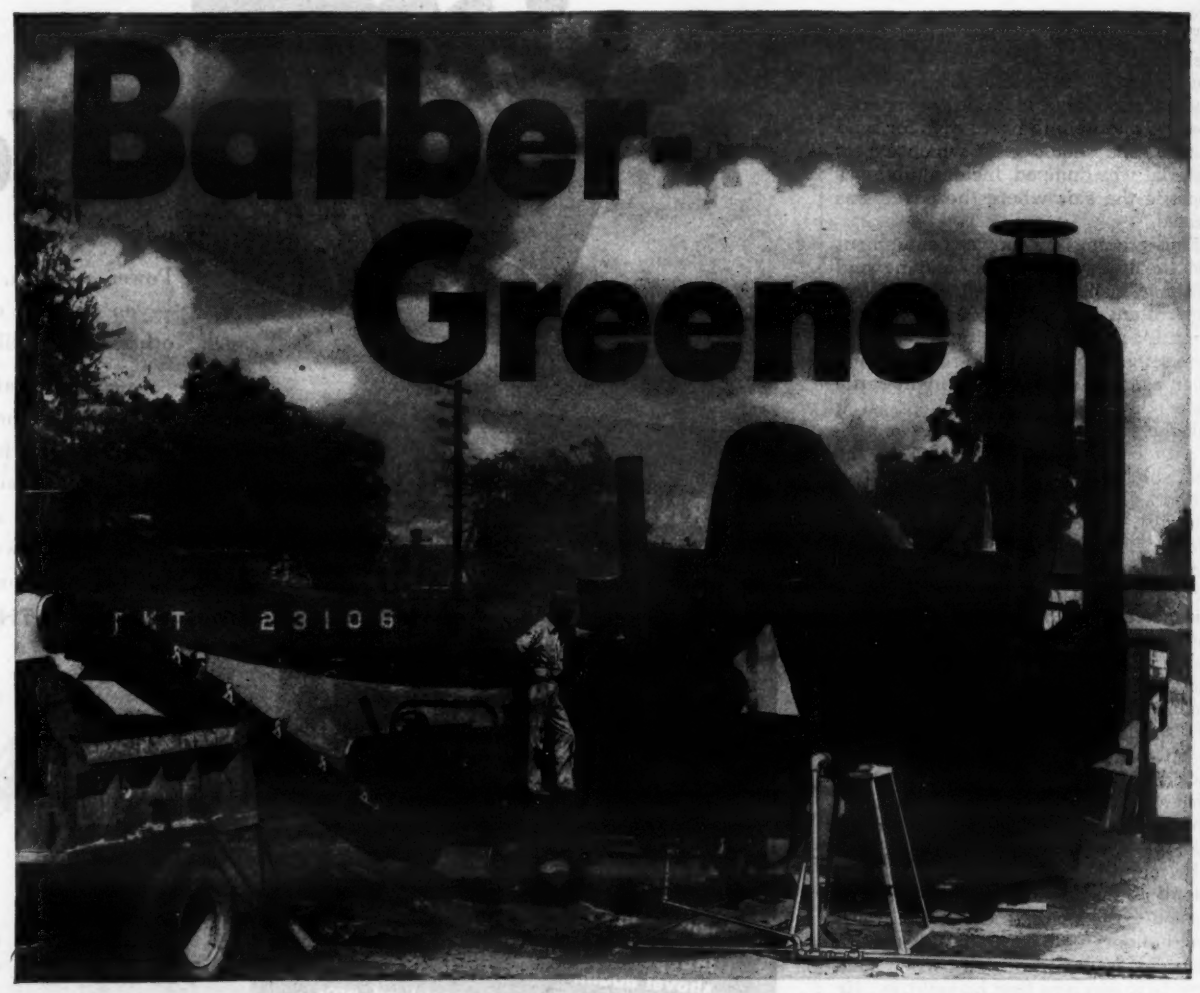

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Here's a complete, easy-to-operate, small bituminous mixing plant! It is specifically designed for maintenance and repair work, small road building projects and a variety of other surfacing jobs. The B-G Maintenance Plant will handle any type of mix, and its capacity is remarkable, considering its size and portability.

The B-G Maintenance Plant is truly portable and easily erected. Small enough to operate at low cost on maintenance and general repair work, it is still large enough to handle small construction projects. It operates on the same principles as the larger Barber-Greene Central Plant, measures the correct amount of aggregate and bitumen, thoroughly mixes them and discharges the mix into trucks.

It consists of two basic units—the 840 Mixer and 830 Aggregate Dryer. Each unit is equipped with a towing hitch and pneumatic tires to trail smoothly behind your truck when going from job to job. A complete line of auxiliary equipment available including Reciprocating Feeder, Bins, Dust Collector, etc. For illustrative literature, write Barber-Greene Company, Aurora, Illinois.

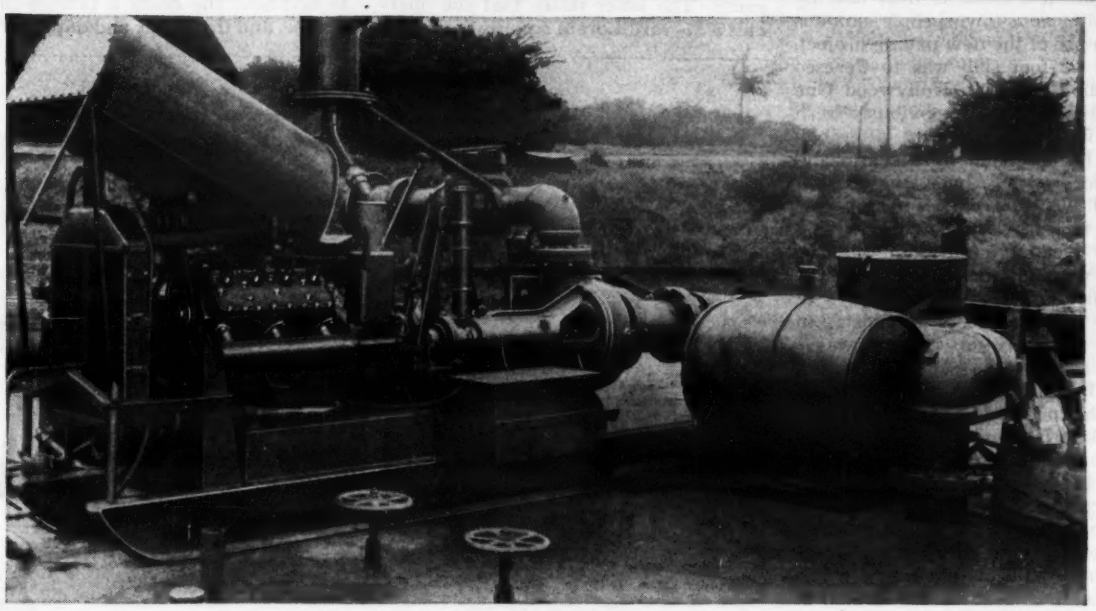
BARBER-GREENE COMPANY • AURORA, ILLINOIS

Constant Flow Equipment

LOADERS PERMANENT CONVEYORS PORTABLE CONVEYORS COAL MACHINES BITUMINOUS PLANTS FINISHERS DITCHERS

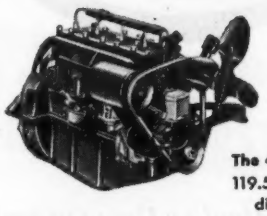
"— speaking of FORD ENGINE ECONOMY"

(as millions of owners have been doing for years)—

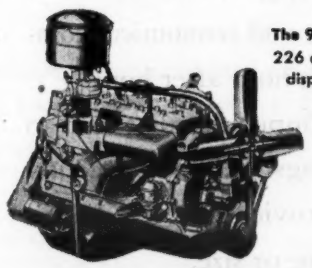


Ford

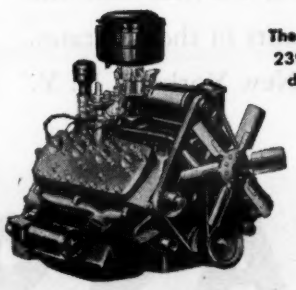
"This Ford V-8 engine Has Pumped 1,250,000 Barrels of Oil in a Year at ¼¢ a Barrel!"



The 40-H.P. FOUR
119.5 cubic inches displacement



The 90-H.P. SIX
226 cubic inches displacement



The 100-H.P. V-8
239 cubic inches displacement

Berard Bros. Towing Co., of New Iberia, La., operates four tugs and nine barges, transporting crude oil. The cost of pumping, cited above by Mr. B. J. Berard, includes labor. In a letter, Mr. Berard adds, "In our many years of crude oil barge transportation we have yet to encounter any pumping unit to equal the economy and performance we now get."

Efficiency, reliability and economy such as this—backed by famous Ford Service everywhere—explain why so many builders of engine-powered equipment have standardized on Ford-built engines. Any electric generating unit, compressor, road and paving machinery, irrigating and fire-fighting unit—any such equipment that must go out "on its own" and pay its way in performance—is well powered when it's Ford-powered. Write for detailed data. Address—

FORD MOTOR COMPANY
Industrial and Marine Engine Department
3507 SCHAEFER ROAD • DEARBORN, MICHIGAN

FORD-BUILT ENGINES

PREFERRED FOR INDUSTRIAL AND MARINE POWER

Select-Sand Blanket Under New Pavement

(*Continued from page 10*)

The sand and rock cars were unloaded by a Koehring 604 clamshell with a 1½-cubic-yard bucket. The materials were stockpiled within reach of the 60-foot boom, and rehandled between shipments to the 30-ton bins in the Johnson plant. Sand and rock were weighed on beam scales and dumped in trucks; cement was later dumped on top of the sand and rock.

The fleet of fifteen batch trucks backed in under the Johnson sand and rock bin, but a haul road was established to let them drive under the bulk-cement bin. Ceresco and its zooming trucks was a scene of tremendous activity those days. Truck drivers racing for the job in a cloud of dust flew by crowds of curious townspeople, anxious for a glimpse of the new paving project. The new 22-foot slab was to Ceresco what Radio Center is to Hollywood. One flossily dressed old lady obviously fresh off the farm on Saturday afternoon grabbed her husband by the arm and said imperiously, "Abner, there's that new road. We've *simply got* to see that!"

Abner took her, and how the two old children escaped suffocation in the cloud of dust, engine fumes, and bulk cement is a mystery. Three days of sunshine had produced the dust, but after all the early-job rains it was a welcome sight.

When Booth & Olson rolled in under the finish line, they had finished another link in Nebraska's comprehensive reconstruction of Route 77 between the state capital and the north. If quality work, excellent organization, and a spirit of cooperation between contractor and state forces make for a good job, then certainly this one measured up.

Perhaps unusual these days was Don Allen's praise of his labor force.

"I'm proud of my boys," he said. "Labor on this job has been everything I expected, and the turnover has not been as great as in other sections of Nebraska and Iowa. We brought most of our key operators, steel setters, and some laborers along when we came here. And we hope that when we leave the job we can add to this group of dependable men some of these local boys."

An excellent recommendation from a man who has not always had such an experience these days, but who is broad-minded enough to carry no grudges and judge a situation as he finds it.

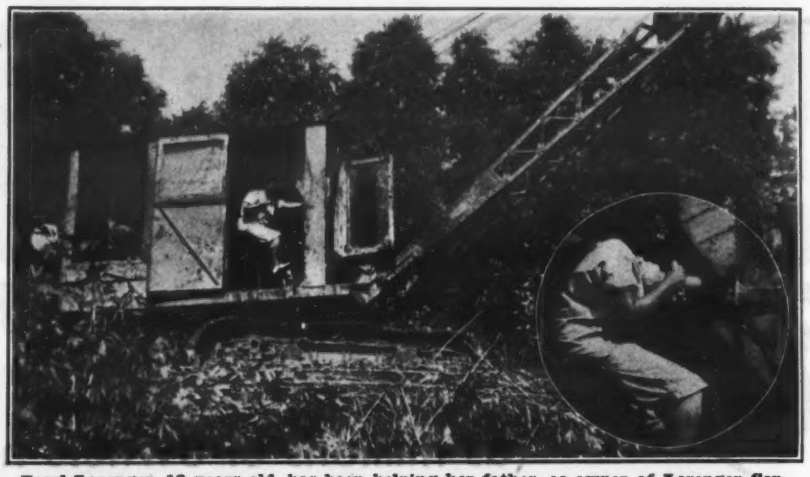
Personnel

Frank P. Schnittker was the Resident Engineer on the job for the Nebraska Bureau of Highways. The job was done under the general supervision of Construction Engineer A. W. Bohner, with F. H. Klietsch as Chief Highway Engineer. Wardner G. Scott is State Engineer for the Department of Roads and Irrigation.

Drag It, Boys, or Lose Face to the Fairer Sex

The wrath of a proud father has come to the fore in a letter received by the editors from E. G. Lorenger. When CONTRACTORS AND ENGINEERS MONTHLY recently took note of a female tractor operator, it unknowingly slighted Pearl Lorenger. Now, to correct this oversight, we wish to warn all contractors and equipment operators to look to their laurels, or suffer the consequence. We have in our midst a female dragline operator!

Eighteen-year-old Pearl Lorenger, recently graduated from East High School, Sioux City, Iowa, has been helping her father, co-owner of Lorenger Construction Co., to operate a Koehring dragline for the past two years. The letter states that she operates a ¾-yard Lorain equally as well as she does the Koehring and, incidentally, that she is as efficient as any male. In addition, she holds a private pilot's license, and the father and daughter enjoy much time in the air looking over new job sites and work completed. The company at present is engaged in soil-conservation projects.



Pearl Lorenger, 18 years old, has been helping her father, co-owner of Lorenger Construction Co., of Sioux City, Iowa, by operating a Koehring dragline for the past two years. He says she's as efficient as any man.

Mr. Lorenger has issued a challenge: "I have seen female truck drivers, cat skinners, etc. But I have never yet seen another woman dragline operator." Are there any more bids? Do you, readers, know of any other female invasions of man's so-called sacred territory? We'd like to hear about them.

Hewitt Rubber Sales Post

The appointment of Robert D. Bernhard to supervise sales in the Indianapolis territory has been announced by the Hewitt Rubber Division of Hewitt-Robins, Inc., Buffalo, N. Y., maker of industrial hose and belting. This territory, which includes all of southern Indiana and Louisville, Ky., was formerly handled from the St. Louis office by A. S. Purmort. Mr. Purmort will now cover Missouri and southern Illinois.

ASSURE CLEANER VALVES

LUBRICATE your compressors with *Texaco Alcaid, Algol or Ursa Oil* and valves will stay *clean* . . . assuring more efficient and economical compressor operation with full air pressure at your drills hour after hour.

Texaco Alcaid, Algol and Ursa Oils are free of impurities that lead to formation of hard carbon deposits. They keep rings free, valve action smooth and lively, ports and air lines clear. They provide Effective Lubrication for all your compressors — whatever their type or size.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 states, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Tune in . . . TEXACO STAR THEATRE presents the NEW EDDIE BRACKEN SHOW every Sunday night. Metropolitan Opera broadcasts Saturday afternoons.

TEXACO

TEXACO

Dump-Wagon Hopper Is Air-Controlled

A line of bottom-dump wagons for earth-moving is made by the Construction Machinery Division of the Southwest Welding & Mfg. Co., 3201 W. Mission Road, Alhambra, Calif. The units are made in 15, 20 and 30-cubic-yard capacities. The 30-yard model has a heaped capacity of 38 yards.

The wagon features a heavy-duty bogie-wheel assembly, large air-operated brakes, Timken bearings, an extra-heavy axle, automatic lubrication, and a ball-and-socket fifth wheel with a safety ring. The hopper doors are air-operated and are said to work with finger-tip control.

Some of the specifications for the Model EW-30 are: length, 35 feet; width, 10 feet 2 inches; door opening, 32 inches; dumping clearance, 3 feet; tire sizes, four 21.00 x 24; air brakes, 17¼ x 6 inches; and approximate gross weight, 105,000 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.

Shown here on a job for Macco Corp. and Morrison-Knudsen Co., at Mills Field, Calif., is the new Southwest 30-yard bottom-dump wagon. Its hopper doors are air-operated.

Portable Lighting Plants

A booklet describing the four new portable lighting and power units made by Davey Compressor Co., No. Water St., Kent, Ohio, has just been issued. It contains complete specifications of the floodlight, searchlight, combination, and beacon models. Designed primarily as lighting units, the Da-V-Lites may also be employed to provide power for electric tools on construction jobs, in quarries, emergency utility or highway repairs, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 61.

INCERSOLL-RAND
HERE
MORE AIR HERE
Get Longer Drill Life!
Prolong the life of your drills — assure fewer repairs and replacements — by lubricating them with Texaco Rock Drill Lubricants (E.P.). These famous, extreme-pressure lubricants prevent rust, resist wash-out, effectively protect all moving parts against wear even in the heaviest service. All conform to the lubrication specifications set by leading rock drill manufacturers.
ubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

AGC Holds Its 28th Annual Convention

Topics Discussed Included Government Control, Land Acquisition, Public Works; Optimistic Note for 1947

✦ THE 28th Annual Convention of The Associated General Contractors of America, Inc., was held in January at the Stevens Hotel in Chicago. The four-day program was attended by approximately 800 members from throughout the country. In general, there was a note of optimism prevailing as to the outlook for 1947.

The meeting was called to order and welcomed by the President, W. S. Bellows. President Bellows estimated $20,000,000,000 as the cost of construction for 1947, barring major strikes or other extremely unusual conditions, with $6,000,000,000 of that for repairs and maintenance. He pointed out that the important job for contractors is to keep construction costs in line with other phases of the national economy, or consumer acceptance may be killed.

He stated that the construction outlook from the point of view of governmental controls is very good, due to the fact that persons in charge of the remaining controls all know construction problems. He also summarized recent changes in Government policy and personnel as favorable. And, pointing to the great construction strides that have been made in the past year both nationally and locally, said there is no reason not to expect continued progress in 1947.

The President's report was followed by that of the Managing Director, H. E. Foreman. Mr. Foreman gave a general picture of the 1947 construction outlook; he reviewed activities of the AGC and its branches, and progress made during the year. He stressed the fact that public works must be sold to the public for their inherent value or need, and not just as a means of defeating depression unemployment.

One of the key speakers was Thomas H. MacDonald, Commissioner, Public Roads Administration. Speaking on "The Highway Construction Program", he pointed out that one serious flaw in it has always been the matter of land acquisition.

"Too often in the past," he said, "the character of road improvements undertaken has been governed by the limitations of shortsighted land-acquisition measures. When the acquirement of land is postponed, as usually it has been, until the very moment of need for construction purposes, it is often discovered that the land actually wanted cannot be obtained without long delay. Time pressing, plans are altered to require less or more-available land, and in the end it is found that too much has been paid for inadequate takings."

He placed the blame for this on poor planning, and on the cumbersome and time-consuming land-acquisition processes prescribed by the laws of many states. He gave examples of the problem and outlined some remedies.

In commenting upon the Economic Report of the President to the Congress on January 8, 1947, he called it a charter which defines the role of public works in the nation's economy. He said, "Never before has there been expressed in concise terms by such high official authority a doctrine so sound. It reflects with singular authenticity the national experience in this field". Mr. MacDonald pointed out the need for stabilizing the public-works program on a long-term basis and the highway construction industry's responsibilities

(Concluded on next page)

AGC Convention

(*Continued from preceding page*)

for such planning.

J. L. Haynes, Chief, Construction Division, U. S. Department of Commerce, discussed the relative position of construction in the U. S. economic picture. He also estimated the amounts of construction materials which he thought would be available in 1947. He said that the contractor and the building-materials producer were second only to food and agriculture in U. S. dollar importance, and that at least one penny of every dime the next generation spends will go into this field.

The gathering was also addressed by E. M. Hastings, 1947 President of the American Society of Civil Engineers. Mr. Hastings discussed mainly his proposed changes in the Society for the coming year.

An address on "Reclamation and the Contractor" was delivered by Kenneth Markwell, Assistant Commissioner of Reclamation of the Department of the Interior. The Navy's Civil Engineers were represented by Commodore Charles T. Dickeman, CEC, USN, who delivered a speech for Rear Admiral J. J. Manning, USN, Chief of the Bureau of Yards and Docks. For the Army Engineers, Lt. Gen. Raymond A. Wheeler, Chief of Engineers, USA, addressed the convention.

A staff report on the Highway Division was given by Harry J. Kirk, Division Manager. A discussion period followed which covered subjects affecting highway contractors, labor relations, election of division chairman and vice chairman for 1947, and new business.

New Officers

Forrest W. Parrott of C. F. Lytle Co., Inc., Sioux City, Iowa, was installed as the 1947 President of the AGC, and Dwight W. Winkelman, D. W. Winkelman Co., Syracuse, N. Y., as Vice President. The 1947 Directors are: District 1, Roy L. Bair, Roy L. Bair & Co., Spokane, Wash.: District 2, Fred J. Early, Jr., Fred J. Early, Jr. Co., San Francisco; William Curlett, Curlett & Harwood, Inc., Long Beach, Calif.; Edward O. Earl, San Xavier Construction Co., Tucson, Ariz.; John MacLeod, Macco Construction Co., Clearwater, Calif.: District 3, A. S. Horner, A. S. Horner Construction Co., Denver: District 4, J. Rutledge Hill, Gifford-Hill & Co., Inc., Dallas; W. D. Amis, Amis Construction Co., Oklahoma City, Okla.; L. F. Rooney, Manhattan Construction Co., Muskogee, Okla.: District 5, George H. Murch, Murch-Jarvis Co., Inc., St. Louis, Mo.: District 6, A. A. McCree, McCree & Co., St. Paul, Minn.: District 7, R. E. O'Connor, J. C. O'Connor & Sons, Inc., Fort Wayne, Ind.: District 8, Walter L. Couse, Couse & Westphal, Detroit: District 9, W. L. Sharpe, W. L. Sharpe Contr. Co., Memphis, Tenn.: District 10, W. A. Young, Cornell-Young Co., Macon, Ga.: District 11, H. C. Turner, Jr., Turner Construction Co., Philadelphia; William Joshua Barney, W. J. Barney Corp, New York; Robert P. Bayard, Johnson, Drake & Piper Inc., New York: District 12, Roy B. Rendle, Roy B. Rendle & Co., Inc., East Boston.

The following were appointed Division Chairmen: Walter L. Couse, Building Contractors' Division; Gayle Armstrong, Armstrong & Armstrong, Roswell, N. Mex., Highway Contractors' Division; and George H. Atkinson, Guy F. Atkinson Co., S. San Francisco, Calif., Heavy Construction and Railroad Contractors' Division.

Photo by Lionel Heymann, A.P.S.A.
Shown here at the Associated General Contractors Convention are, left to right, D. W. Winkelman, of Syracuse, N. Y., newly elected Vice President of the association; H. E. Foreman, the Managing Director, and F. W. Parrott, the new President.

The American Red Cross needs and deserves your generous support. Give to its 1947 fund. Its success depends on your generosity.

CONTRACTORS RUBBER PRODUCTS

available from Stock for immediate Delivery

CONVEYOR, ELEVATOR and TRANSMISSION BELTING
all widths and plies

V-BELTS all sizes

HOSE
all sizes and types

AIR DISCHARGE STEAM
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BOOTS, BRIDGE SLEEVES, PUMP DIAPHRAGMS, ETC.

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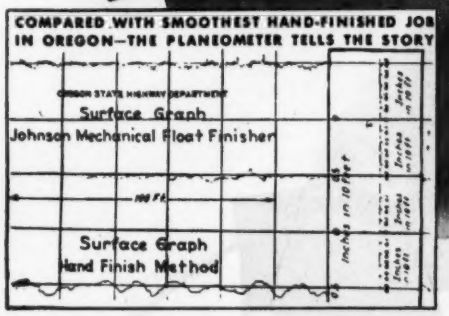
COMPARED WITH SMOOTHEST HAND-FINISHED JOB IN OREGON—THE PLANEOMETER TELLS THE STORY
OREGON STATE HIGHWAY DEPARTMENT
Surface Graph
Johnson Mechanical Float Finisher
100 Ft.
Surface Graph
Hand Finish Method
Inches in 10 feet

SMOOTHNESS TEST

Illustrating the remarkable finishing done by the Johnson Float Finisher, these graphs, made by the Oregon State Highway Commission, show a variation of less than .05 of an inch per 10 feet—.02 less than state requirements.

JOHNSON *float* FINISHER

INCREASE DAILY PRODUCTION of your paving crew with a Johnson Float Finisher by eliminating the bottleneck of finishing operations. Here is a mechanical finisher that completely *float finishes* pavement and makes it ready for edging and jointing. No voids or pockets are left! No high spots! No low spots! And no float finishing to do by hand.

Two men—one to operate the Johnson Float Finisher and one to edge and joint—can turn out 2000 to 3000 feet of road surface to a tolerance of .05 of an inch in the length of a 10-foot straight edge.

Authentic data from past performances prove conclusively that the savings in time and labor will pay for a Johnson Float Finisher in less than 25 miles of highway finishing. Standard specifications of many states require the Johnson Float Finisher. Get the facts today! Write for illustrated catalogue.

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The 7-yard capacity and 20-foot maximum discharge height of the new Tournamixer make it applicable to a variety of concrete jobs.

Big Portable Mixer Discharges to Forms

A 7-yard-capacity portable concrete mixer which discharges at heights up to 20 feet has been developed by R. G. LeTourneau, Inc., at its Longview, Texas, division. Designed for use with the Tournalayer in concrete-house production, it is applicable to mass-concrete jobs such as flood walls and bridges, as well as paving. Its high-level discharge eliminates distribution or discharge chutes, troughs, wheelbarrows, etc., and scaffolding and hoisting equipment, according to the manufacturer.

The Tournamixer is mounted on pneumatic-tired wheels for portability, and features a novel principle of discharge. It operates at a selectively variable speed in either direction of rotation of the drum. In one direction, it mixes the concrete. In the other, the corkscrew action of the blades forces the mixture out, thereby eliminating the need for a discharge door.

The main components of the Tournamixer are the main-frame structure, swing-frame structure, mixing drum, and the draft unit, which is a two-wheeled rubber-tired Tournapull. The main frame, supported by large pneumatic tires at the rear, provides a pivotal mounting for the swing frame. The swing frame provides a cradle in which the drum rotates; it is pivotally connected to the main frame above the base of the drum. The drum is an elongated steel structure which contains helically shaped blades, progressing in size proportional to the size of the drum. Water and dry mix are introduced into the open end, but there are two manholes for inspection, cleaning, or alternate loading.

The Tournamixer is driven directly by its power plant which is located at the central or rotating axis of the drum. This type of drive is accomplished through the medium of a splined hub which is bolted to the drum and attached to the power unit by an internal spline. This causes the drum to turn one revolution with each revolution of the power unit.

The power unit itself consists of an electric motor and built-in gear box, the driving spline of the gear box being substantially in line with the rotor of the motor. This unit does not require the use of chains, belts, or other means to transmit the power, and thereby is claimed to reduce friction losses and undesirable torque.

The drum motor and gear box provide one bearing connection between the drum and the swing frame; its purpose is to provide a variable-speed dual-rotation drive for the drum. A motor unit mounted on the main frame contains a windlass and cable system which operates through the sheave block on the main and swing frames to produce elevation and depression of the mixing drum.

When the discharge end has been spotted directly over the desired placing point, during pouring operations, the operator rotates the drum in a direction opposite to that of mixing in order to discharge the concrete. Due to the power-steering mechanism, he can move the discharge end of the machine in an arc to give an even distribution of concrete at speeds varying from 5 to 18 rpm.

The Tournamixer weighs in the neighborhood of 30,000 pounds and travels up to 22.5 mph. It is 9 feet wide and approximately 45 feet long, although its barrel may be lengthened or shortened to meet the requirements of the job.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 2.

Armco Promotes Patton

The advancement of M. C. Patton to the position of Vice President and Assistant General Manager has been disclosed by Armco Drainage & Metal Products, Inc., Middletown, Ohio. Mr. Patton joined the organization in 1926, and has held various positions since. He has been Assistant General Manager and a member of the Board of Directors since 1945.

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

Dealers in all Trade Centers

The Biggest Little Hoists in the world for use where power is not practical, available, or sufficient.

2-Ton "Lightweight"	75 ft.	⅛"
½-Ton "General Utility"	250 ft.	¼"
15-Ton Triple-Geared "Special"	1200 ft.	½"

With patent gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	$ 50
½-Ton 4 & 24 to 1	110 lb.	75
15-Ton 4, 19 & 109 to 1	680 lb.	250

BEEBE BROS.
2724 6th Avenue So. Seattle 4, Washington

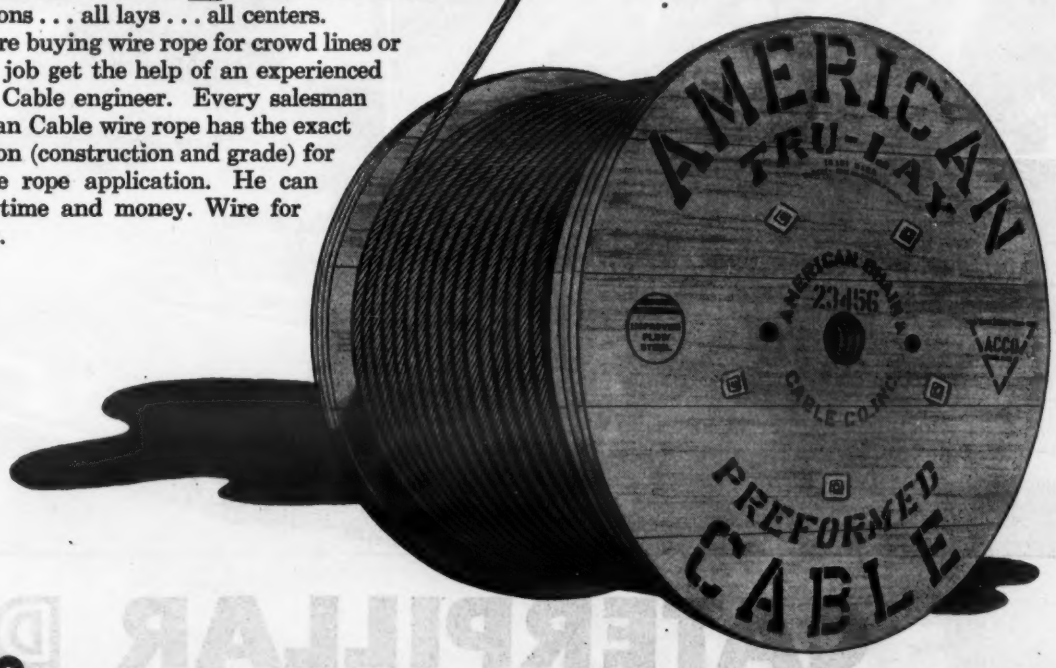
TRU-LAY Preformed for CROWD LINES

Heavy rocks and gravel make crowd lines quiver with strains. Yet it is in just such service that TRU-LAY Preformed proves its ability to take punishment.

The ideal wire rope for crowd lines is TRU-LAY Preformed Improved Plow Steel. It gives better and longer service. It represents the proper combination of strength and toughness for the most grueling jobs. With this combination go long experienced engineering and thorough step-by-step inspections. And TRU-LAY Preformed comes in all constructions . . . all lays . . . all centers.

If you are buying wire rope for crowd lines or any other job get the help of an experienced American Cable engineer. Every salesman of American Cable wire rope has the exact specification (construction and grade) for every wire rope application. He can save you time and money. Wire for him today.

LASTS LONGER
HANDLES EASIER
LESS LIKELY TO KINK
SPOOLS BETTER ON DRUM



ACCO Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Emlenton, Pa., Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

Conciliation Service For Labor Disputes

The work of the U. S. Conciliation Service is described in a pamphlet recently made available. The booklet is sponsored by the Service's Labor-Management Committee, and should be of value to employers and union representatives alike.

It gives the names of the committee members and explains who the conciliators are, how they can help, and what they do. The pamphlet also describes the services provided by mediators, technical commissioners, and arbitrators.

Copies are free and may be obtained by writing to William B. Smith, Chief, Magazine Service Section, Office of the Secretary, Department of Labor, Washington, D. C.

Portable Radial Saw

The operation and features of its line of radial saws are described in a catalog recently released by the American Saw Mill Machinery Co., 171 Main St., Hackettstown, N. J. Featured are the lightweight portable saws which are made almost entirely out of magnesium, and can be carried to the job location by two men.

The Monarch Uni-Point saw may be used as a crosscut saw, a rip saw, for making miters, or for cutting bevels at any angle. Because of the Uni-Point principle, it is claimed that considerable time can be saved on jobs.

Catalog 7350 points out that because the saw always cuts in the same spot, it does not need to be stopped or repositioned when changing angles. It also describes in detail the portable Model TNT saw, other stationary models, and the various saw blades.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 70.

Gracely Heads Marion Co.

The election of Harvey T. Gracely as President and General Manager of Marion Power Shovel Co. took place at a recent meeting of the board of directors. He succeeds M. E. Montrose.

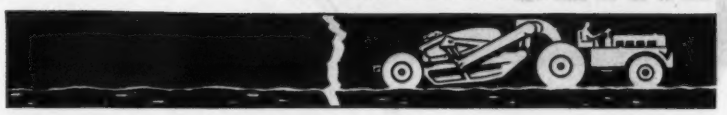
Mr. Gracely started with Marion in 1901, and with the exception of a few years, has been with the company ever since. He has held several key positions in design, production, sales, and administration.

EFFICIENCY BRIGADE

"Caterpillar" builds the units you need to zone equipment for lowest costs on earth

1 Track-type tractors for "push"-distance earthmoving.

2 Track-type tractors for loading and pulling scrapers on medium hauls.



3 Wheel-type tractors for high-speed long hauls. —plus motor graders for finishing work.

HERE'S a typical example of matched equipment zoned to the job—the ideal way to go sailing through an operation with minimum lost motion and maximum time and money saving. It's a traffic bypass project (Los Angeles) to which Peter Kiewit Sons Co. (one of America's largest contractors) assigned a brigade of equipment that included two sizes of "Caterpillar" Diesel Tractors, a "Caterpillar" Diesel No. 12 Motor Grader—with scrapers, bulldozers and tampers to fit their power and controls.

Other important "accessories" you don't see—but no doubt know about—are proved "Caterpillar" quality, dependability and operating economy . . . plus dealer service that is widely regarded as the most complete, efficient and best equipped of its kind.

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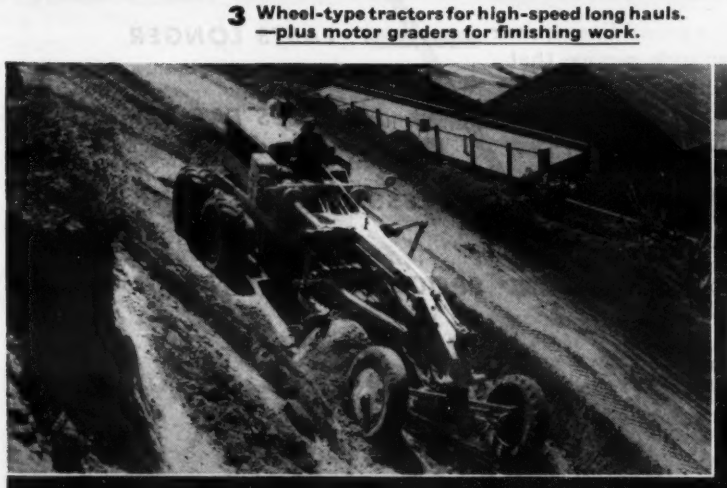

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Water Tunnel Pierces Soft Hill

Conveyor System Is Used Between Mucking Machine And Railroad in Small-Diameter 6,242-Foot Bore

✦ PUSHING through cemented clay and sand at a speed of 36.5 feet per day, L. E. Dixon Co. of San Gabriel is hurrying to hole through the west portal of Grossmont Tunnel on the San Diego Aqueduct in California. Grossmont Tunnel will be the only underground work between San Vicente Reservoir and San Diego. Dixon's $709,130 contract with the City of San Diego is a part of the water-supply system known as the El Monte pipe line.

With a time limit of 375 calendar days from August 28, 1946, work is being pushed rapidly. Time-saving methods are in use. For example, a 120-foot conveyor system handles blasted muck from the loading machine to railroad cars, reducing congestion and lost time in the 8-foot 8-inch rough bore. Timber lagging is cut by power saws outside the tunnel and hauled in with the steel arch-support bracing. The job is claiming the full-time attention of Project Manager J. P. Williams, and tough old "Paul Bunyan" Guinn is directing tunnel work. He is the man who, under Frank Crowe, drilled the Boulder Dam river-diversion tubes. For him this is Tunnel Number 44.

Alignment of the Grossmont Tunnel is straight, with a slope of 0.00032 from west to east portal. Near the east portal there will be 250 feet of overburden above the tunnel, dwindling to about 30 feet at the west end. The rough tunnel bore, mostly through a soft cemented clay and sand which requires support, is 8 feet 8 inches in diameter.

Standard 13.8-pound H-beams with 4-inch dimensions, bent on a 3-foot 8-inch radius at the top, are used every 5 feet to support the tunnel. Rough fir lagging in pieces 2 x 12 inches x 5 feet is used above the steel ribs, and some of these timbers will have to stay in place when the 8-inch reinforced-concrete tunnel lining is poured.

When the tube is finished it will have a smooth 6-foot-diameter circular concrete lining, reinforced by ⅞-inch round transverse steel bars on 8½-inch centers. Longitudinal bars will be ⅝-inch round steel, spaced on 18-inch centers. The steel reinforcing mat will be placed 6 inches from the inside face in the concrete.

Open-Cut Excavation

An open cut, preliminary to facing off both portals, was made by a Northwest 1½-yard dragline. Work was done first on the east portal. The open trench was dug to a bottom width of 10 feet, with ½ to 1 side slopes. The earth was soft at the portals, and explosives were not needed. Excavated material was cast to each side of the open cut.

Arrangement of Yard

Dixon's yard at the east portal is arranged for the smoothest possible flow of men, material, and supplies to and from the tunnel face. The job office is set at the end of an access road, well away from the center of the yard.

C. & E. M. Photo

The Dixon Co. yard at the east portal of Grossmont Tunnel is arranged for the smoothest possible flow of men, material, and supplies. Note the transformer bank on the transmission-line poles at left; this is the power source for the job. The shed at the extreme left houses the Sutorbilt fan which supplies air to the tunnel.

Near the tunnel portal was built a shed which houses the drill compressors and a room where men can change their clothing. Two Gardner-Denver 365-cfm air compressors, driven by 75-hp electric motors, discharge air through an aftercooler and a receiver tank 3 x 14 feet. A 4-inch-diameter header, supported by wires and the steel H-beam tunnel supports, carries air to the drills.

Three-phase current for the Westinghouse and General Electric motors is supplied from a 6-kv transmission line near the job. A temporary transformer bank steps the voltage down from 6,000 to 440.

Directly across the open cut, and also near the east portal, a shed houses the huge 2,000-cfm Sutorbilt reversible fan which supplies air to the tunnel through a 10-inch steel header. Driven by a General Electric motor, this fan can be reversed to draw blast smoke away. Ex-

(Continued on next page)

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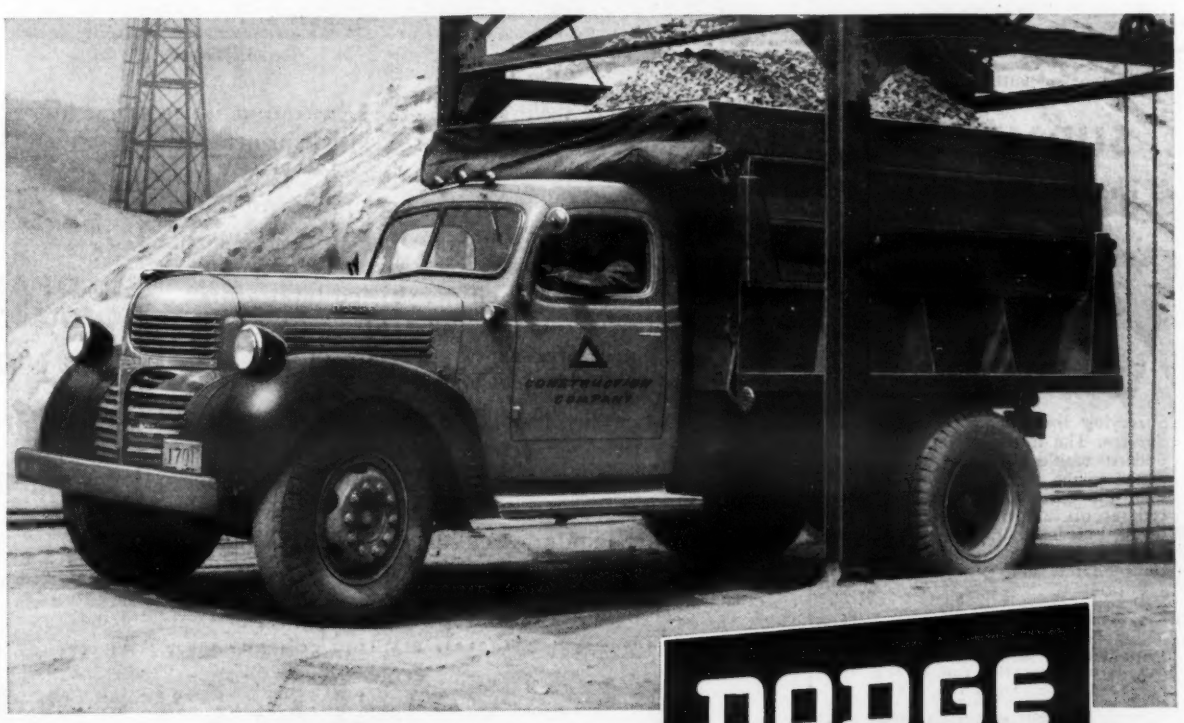

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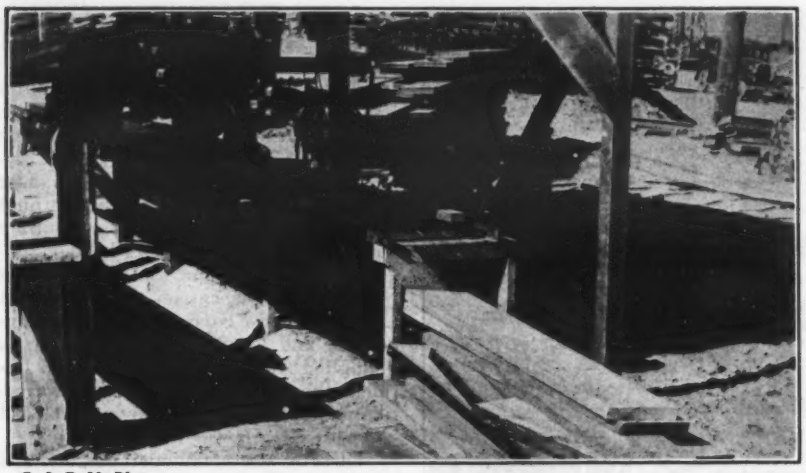

C. & E. M. Photo
To save time, Dixon Co. set up this carpenter shed near the railroad where rough fir timber for tunnel lagging is unloaded. A set of roller-bearing idlers on the Comet saw track helps the carpenter turn out 2-inch lagging fast.

Water Tunnel

(Continued from preceding page)

cept for a 20-minute period after each shot, this fan ordinarily pours a steady stream of fresh air to the men at the face.

A 24-inch narrow-gage railroad leads with only one curve from the tunnel out through the yard and over the top of an 80-cubic-yard steel hopper, set in the bottom of a deep wash. A carpenter shed has been set near this railroad, so that the timber lagging and spreader blocks can be loaded rapidly to a service car and hauled to the crew.

One man with a Comet power saw is able to keep timber ahead of all three shifts. The rough fir lumber comes in by truck and is unloaded close by the carpenter shed. Steel angle irons with ball-bearing idlers on both sides of the saw permit this one man to handle long 2 x 12's with hardly any effort.

H-beam tunnel supports in half sections are also unloaded close to the narrow-gage railroad, and enough bracing material for one round is hauled in at every blast. Spare drill augers and other supplies are always unloaded near the railroad, and even the small and delicate parts for air compressors are stored close by those machines.

Tunneling Methods

The tricky formation, soft but abrasive, is drilled with three Gardner-Denver auger air drills. Gardner-Denver 6-foot auger bits are used to sink the drill holes, and the rounds are checking out close to 5 feet each. The formation is so abrasive that the 2-inch-diameter auger bits dull and lose gage after drilling through three holes.

The face is drilled with an 11-hole pattern, which has worked extremely well in removing some 2.13 cubic yards of material per linear foot of tunnel. Two cut holes are made on an angle, near the center part of the face. Two rib holes are drilled on the same level as the cut holes but close to each wall line.

A single cut-reliever hole centered just above the two cut holes is designed to break downward. Slightly higher, on both wall lines, are two arch holes, with the back drill hole placed near the top of the face and on the center line of tunnel. Three lifter holes are also drilled equidistant across the bottom of the tunnel face.

The system of holes is designed to produce this result: the cut holes explode first, kicking out a center void. The cut-reliever and rib holes then break loose material in towards the center void. The arch holes and back hole break down all overhanging material to the top tunnel-line limit. Finally the three lifters explode, breaking the formation at the floor line and jarring the broken pile of rock out towards the mucking machine.

Approximately 45 minutes have been required in drilling the eleven holes; this is the most time-consuming part of a round. Holes are loaded with from four to five 8-inch sticks of 30 per cent Hercules gelatin. Electric blasting caps with five standard delays are used, and the charge for each round is set off with the tunnel light circuit from a safe distance of 1,000 feet.

At this stage the outside fan is reversed for 20 minutes to suck the blast smoke away. It is necessary to operate the fan about 5 minutes after the tunnel face clears to make sure all fumes are away from the 10-inch air header.

A Gardner-Denver mucker then moves up to the 20-cubic-yard pile of

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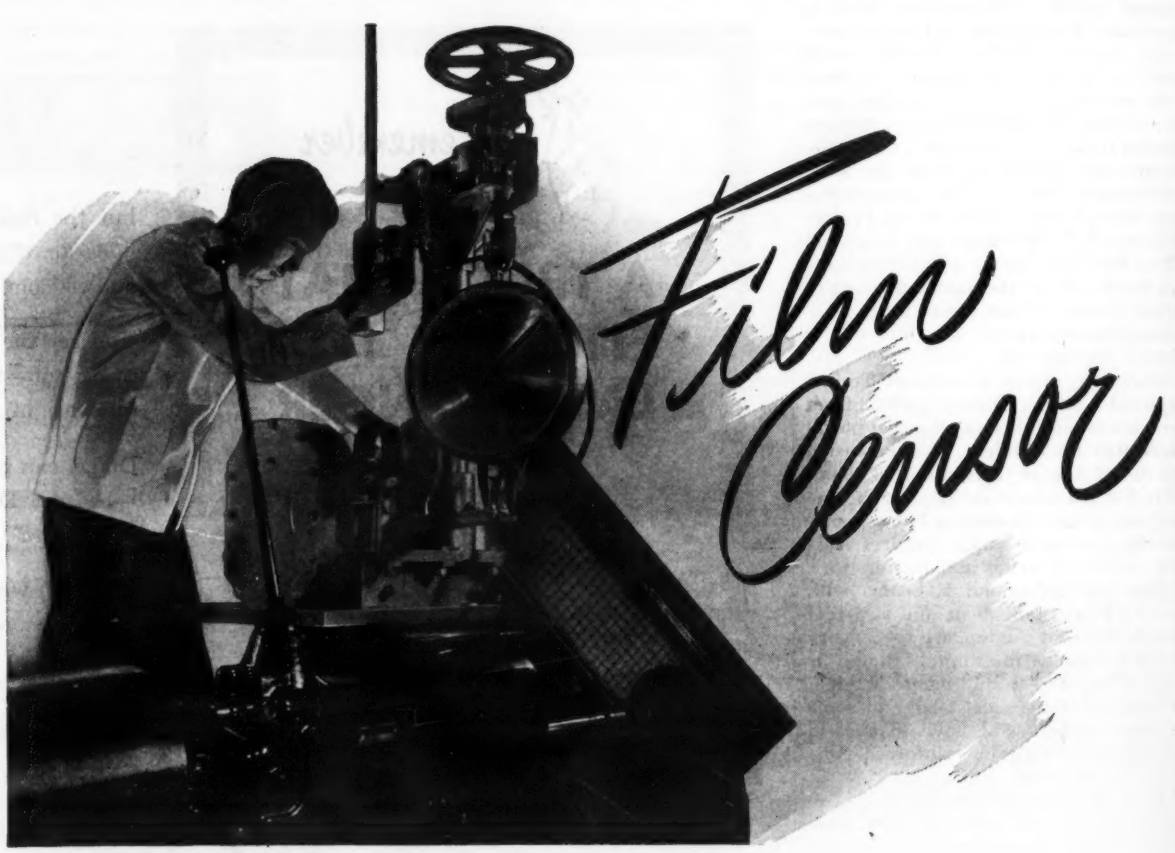

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C. & E. M. Photo
Mucked material from each blasting round on the Grossmont Tunnel is loaded from the conveyor to ten Madsen 2-yard side-dump cars. These haul it over an 80-cubic-yard steel hopper set in the bottom of a deep wash, and dump it.

Water Tunnel

(Continued from preceding page)

broken material, and operates with limited headroom to remove the shot. This machine discharges to a special conveyor 120 feet long with a 24-inch rubber belt. According to "Paul Bunyan" Guinn, he first used this tunnel innovation in 1938 in a tunnel on the Salt Lake Aqueduct. The belt is driven by a Gardner-Denver Model MEH air tugger, through a drive sprocket and chain.

The conveyor rides on a wheel-mounted steel framework. The track which carries the conveyor is 48-inch gage, with 16-pound steel rails. This track is set a foot in the clear on either side of the narrow-gage tunnel railroad, and allows a train of ten 2-yard Madsen side-dump cars to back in under the conveyor. The first car behind the General Electric battery-type locomotive is filled first. As the train moves forward the succeeding cars are filled until all ten are loaded. These are enough to dispose of broken material in each blasting round.

The front car of each train is always a flat-bed service unit. When the train pulls out, fully loaded, this car full of bracing lumber, H-beam frames, and tie rods is left at the end of the track. Part of the crew starts to work unloading this material, while the three miners take off any rock protuberances with sharp-pointed steel gads or clay spades on the jackhammers.

The steel arch is put together by a 2-bolt flanged connection at the top, and set on a 2 x 10-inch foot block at the bottom of each leg. Each set of arches is stiffened by six steel tie rods, with 4 x 4-inch timber spreaders between the arch supports. Just before the new arch is finally tightened, the foreman checks the flange point against two plumb bobs suspended from known survey center-line points in the roof. As the tunnel goes forward these center-line points are kept ahead by a survey party of the City of San Diego.

Sometimes there is a little excess material left over after the walls have been trimmed for the supports, but it is always picked up by the mucking machine and loaded on the conveyor belt. When the bracing is all in and checked for alignment, work is ready to proceed on the next round.

Meanwhile, the 20-cubic-yard trainload of broken muck is hauled out over the steel bin, and the cars are dumped. Because of limited right-of-way a great portion of excavated rock has to be hauled away. The Dixon Co. is accountable for the removal of this material, and generally has several Ford dump trucks on hand. By giving the material away at the bin to private users who want the broken muck for fills, it has been possible to keep the number of dump trucks to a minimum.

When the job was visited for CONTRACTORS AND ENGINEERS MONTHLY no concrete work had begun, and none was planned until the bore holed through. Three tunneling crews were working 8 hours each. Each crew, under its foreman, was made up of a motorman, a brakeman, 3 miners, 2 chuck tenders, a muck-machine operator, and a compressor man. A telephone from the tunnel face to the outside was used for signaling.

On the day shift a carpenter, an electrician, and a repair mechanic were employed. The total payroll was made up of only 40 men for the project.

Tunnel men are notorious windjammers, and these are no exception, for

(Concluded on next page)

C. & E. M. Photo
From left to right are Bill Copenhaver, Office Manager; "Paul Bunyan" Guinn, Superintendent; and J. P. Williams, Project Manager for L. E. Dixon Co. on its contract to build the Grossmont Tunnel on the San Diego Aqueduct.

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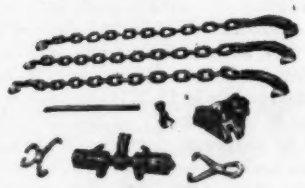

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C. & E. M. Photo
This inside view of the Grossmont Tunnel shows the H-beam tunnel supports, the air and ventilating headers, and the light system. An extra-long tripod on the transit allows surveyors to see over the top of the conveyor.

Water Tunnel

(Continued from preceding page)

the men here are gathered from all over the west. The half-hour lunch session is spent back from the face, where the boys have persuaded the carpenter to build fold-away benches supported by the tunnel bracing. The day the project was visited on the day shift, the hard-rock men under Shift Foreman Howard Foster had a most interesting session. In 30 minutes the accounts of their exploits with tunnels and women broke all world's records.

Personnel

In addition to those men whose names have previously been mentioned, Dan Daggs is General Foreman for L. E. Dixon Co. Glen West and Oris Holman are swing and graveyard-shift foremen, and Bill Copenhaver is Office Manager.

The project is being conducted under the supervision of Fred D. Pyle, Hydraulic Engineer for the San Diego Water Department; Paul Beermann, Assistant Hydraulic Engineer; L. H. Hill is Field Engineer; and Carl R. Rankin, Consulting Engineer.

Completion of the Grossmont Tunnel will mean that the day is close at hand when the new water-supply line from San Vicente Reservoir to the city's pumping stations will be a reality. Additional water is also being brought to San Vicente Reservoir from the San Jacinto Tunnel of the Metropolitan Aqueduct, under a Navy-sponsored program. The reach far out of the city for more and more water is an indication how fast San Diego is growing.

Line of Trucks Has Twenty-One Models

Its 1947 line of trucks was recently presented at a special press preview by the International Harvester Co., Motor Truck Division, 180 No. Michigan Ave., Chicago 1, Ill.

The complete line was represented, from small ½-ton pickups to the giant W off-highway models ranging up to 90,000 pounds gross vehicle weight. In presenting the new models, the company pointed out that through the cooperation of management and labor it was possible to begin production of the '47 line without losing any man-hours.

International Harvester makes 15 basic models in its KB line, and 6 in the new W line. The 21 models are powered by 13 different engines. With adaptations and conversions, the line includes more than 1,000 different trucks, the company states. The range of 21 models, it also says, means trucks that are engineered units fitted for particular jobs.

Major changes have been directed to increase the safety and comfort of drivers: easily reached controls, rubber-cushioned adjustable seats, wide windows, and others. Standard W line cab equipment includes heater, defroster, ventilating system, dual windshield wipers, dual sun visors, and screened cowl top and side ventilators.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 3.

Link-Belt West Coast Plant

The Link-Belt Co. Pacific Division, Seattle, Wash., manufacturer of conveying and power-transmission machinery, announces that it has completed and is now occupying its newly built plant at 3405 Sixth Ave., So., Seattle 4. The new plant contains a machine shop, larger warehouse facilities, and an up-to-date office building.

Fred A. Koepf, District Manager, and Harvey V. Eastling, Manager of engineering sales, with headquarters in Seattle, direct the activities of the company in the Pacific Northwest area.

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Equipment saves time and money on a roadside seeding project in Ohio. Left, a Seaman Pulvi-Mixer, pulled by a Caterpillar tractor, loosens the soil and mixes in bulk lime. Seeding was done at the rate of 4 pounds per 1,000 square feet. A Byers seeder-roller, shown at right, was used in this operation.

Machines Speed Up Seeding and Mulching

A new method of roadside seeding and mulching being used by the Ohio Department of Highways has been reported by W. J. Garmhausen, Division Landscape Architect, at Chillicothe, Ohio. The operation includes the use of a Seaman Pulvi-Mixer and a Byers seeder and roller. In most cases, a crew of four is sufficient with this equipment.

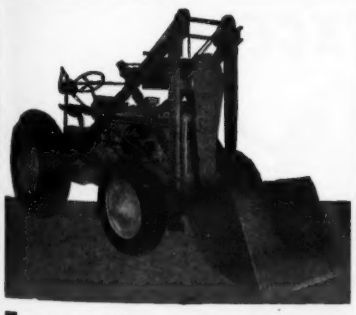
The area to be seeded is given an application of lime, the quantity varying with the soil structure. Bulk lime is used and is applied by a lime spreader. The Seaman Pulvi-Mixer, pulled by a crawler tractor, loosens the soil and mixes the lime to a depth of 2 inches.

A 10-6-4 fertilizer is spread over the area by means of a chip spreader. The sacks of fertilizer are opened into the truck bed, and the material is worked through the door of the tail-gate into the chip spreader which distributes it evenly over the area. Then the Seaman Pulvi-Mixer is again used to work in the fertilizer to a depth of an inch and to obtain a fine seed bed.

Seeding is done with the Byers seeder at the rate of 4 pounds per 1,000 square feet; the seed is covered at least an inch deep. A straw mulch is then used over the area. An even distribution is essential; thickness of material depends upon the time of the year the seeding is done. The Pulvi-Mixer is run over this mulch to tie it down until rain or grass growth will keep it from moving.

Heavy traffic, including bus and truck vehicles, does not have any effect on the mulch if properly secured by this method, the Department has found. Usually, setting the machine at 1-inch depth is sufficient. Germination of seed and grass growth is as rapid as any other method attempted by the Department, and a good grass-covering job is the result.

The Department officials feel that the saving in time as well as the use of fewer men seems to warrant more general use of these new pieces of equipment.



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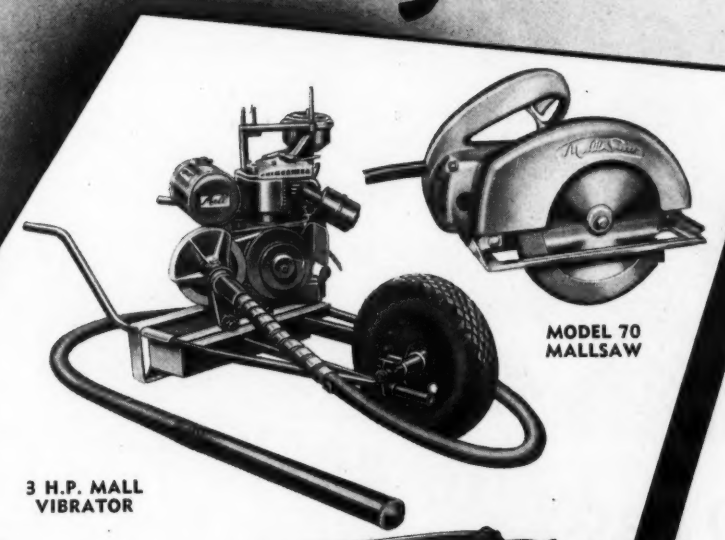

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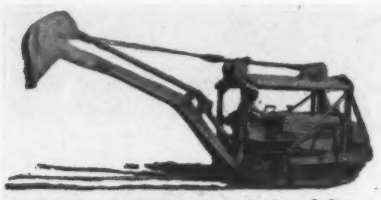
7743 SOUTH CHICAGO AVENUE, CHICAGO 19, ILL.
See Our Advertisement in THE SATURDAY EVENING POST—April 5 issue.



The Sargent backhoe is designed for use on crawler tractors, in conjunction with the Sargent Overhead shovel, and is a permanent attachment that does not interfere with ordinary tractor operations.

Backhoe Attachment For Use on Tractors

A backhoe attachment, for use on crawler tractors in conjunction with the Sargent Overhead shovel, is now being manufactured by Maine Steel, Inc., South Windham, Maine. It consists of a permanent tractor hook-up attachment plus a boom and a special ditch-digging bucket; these replace the regular shovel arm and bucket on the Sargent Overhead shovel.

Said not to interfere with ordinary tractor operations, the attachment does not have to be removed after each use. Bucket dumping is either manual or automatic, and the bucket is equipped with an automatic cleaner that operates at every dumping.

It is claimed that the Sargent backhoe will dig a trench 5 feet deep in gravel or loam at the rate of 135 feet per hour; in wet blue clay, it will dig a 6½-foot trench at the rate of 60 feet per hour. At the present time, it is available in two sizes, Models B and D, to fit Cletrac tractors. Weight of the Model B boom and bucket is 1,435 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 5.

PCA Promotes Three

The promotion of three members of its scientific research staff has been announced by the Portland Cement Association. F. R. McMillan, Director of Research since 1927, has been appointed Assistant to the Vice President for Research and Development. H. F. Gonnerman, Manager of the research laboratory in Chicago for the past 19 years, advances to the position of Director of Research. William Lerch, senior research chemist in the Chicago laboratory since 1940, is promoted to the position of Manager of the Department of Applied Research.

These promotions are part of an expanded research program of the Association which was announced in 1946. A number of younger chemists, engineers, and physicists are also being added to the staff.

You can't pass road mixes across the counter like sugar or salt, but certain unique features of KOTAL MASTER MIXES make it possible to handle them almost as easily as that.

KOTAL MASTER MIXES can be stockpiled ready for delivery in any quantity at any time, regardless of season or weather. That's a great convenience and a saving for plant, contractor and customer. Only the KOTAL Process makes this possible.

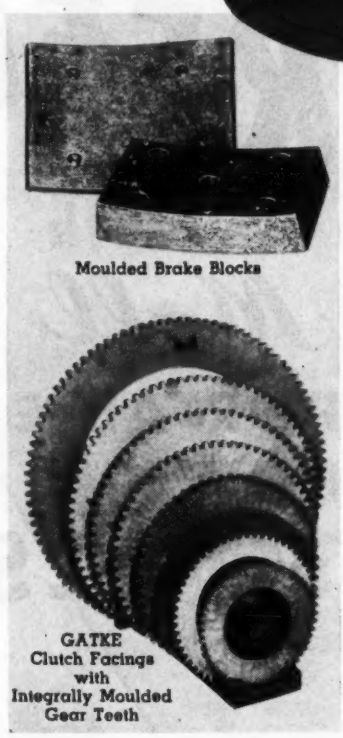
Let us tell you more about this important scientific development in the art of road building and maintenance. We'll gladly send free booklet to you—also the name of your nearest supplier.

KOTAL COMPANY
360 Springfield Ave. ★ Summit, N. J.

KOTAL Master Mixes
The Advanced All-Weather Aid in Building Better Roads

GATKE BRAKE MATERIALS for TOUGH JOBS

GATKE Moulded Swing Friction



Moulded Brake Blocks

GATKE Clutch Facings with Integrally Moulded Gear Teeth

Tremendous Power—no let down when things get hot.

Smooth Action—no grabbing.

Long Wear Life beyond comparison.

These are a few of many extras built into GATKE *CUSTOM-BILT* Brake Materials that help speed production and avoid delays.

RESULTS TALK. Just use GATKE Brake Materials on your toughest applications and compare performance with the best you ever had.

Whatever the application, send for the GATKE Recommendation.

GATKE CORPORATION
232 N. La Salle St., Chicago 1, Ill.

Any Way You Look at 'em . . . STERLINGS EXCEL!

Plan NOW to Use these BETTER BARROWS as Soon as They are Available!

Carefully examine every detail of a Sterling Wheelbarrow—tray, braces, wheel, legs and handles. You'll find that Sterlings are engineered and built to take hard punishment over a long period of years. Right now, the demand for Sterlings exceeds the supply. But we are looking forward to the time when we can again take care of your normal barrow requirements.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

Equipment Serviced At Central Garage

Routine Inspection Helps To Prevent Trouble With State Machines; Varied Types of Repairs

✦ THE equipment used in maintaining the roads and bridges of Rhode Island is serviced and repaired at the Department of Public Works Central Garage. This is located on Okie Street in Providence, the state capital. The Department also has a smaller garage at Belleville in the town of North Kingston, but it handles only minor repairs. Scattered throughout the six divisions of the State Department of Public Works are sixteen other garages used solely for the storage of equipment. Of these, six are rented and the others are state-owned.

Once a year every truck, whether in need of repairs or not, is brought from its local headquarters into the Central Garage at Providence for a thorough check-up. Here the unit is completely overhauled and repairs of a major nature are performed if necessary. By these routine inspections mechanical shortcomings may be detected and corrected; possible trouble on the road at a later date, with the inevitably more costly repairs, is eliminated.

The garage is a low one-story building with a 138-foot front on Okie Street and a 100-foot depth. It is of concrete-block construction covered by stucco, and is entered from the south or street side through two 12-foot square sliding doors. Down the center of the building is a row of Lally columns supporting a steel I-beam; this serves the dual purpose of holding up the wooden roof stringers which cross over from the side walls, and anchoring two Peerless 5 and 10-ton overhead hoists. Natural lighting comes from windows around the sides and from spacious skylights in the roof; these also aid in ventilating the garage. Drop electric lights hang where they are needed, and an oil burner in the cellar furnishes heat. The concrete floor has drainage inlets.

Equipment Maintained

Since the State acquired the building in 1928, this garage has taken care of servicing and maintaining the equipment owned and operated by the D.P.W., which now includes:

162	trucks
8	rotary power brooms
10	tractor mowing machines
16	power mowers
5	Nelson loaders
11	cold-patch bituminous mixers
7	concrete mixers
10	gasoline rollers
1	steam roller
4	power graders
2	tree-spraying machines
3	trailers
120	sanding machines
7	Buckeye stone spreaders
6	air compressors

When one of these units enters the garage, a repair order is made out in the 9 x 18-foot office at the southwest corner of the building where the garage foreman has his headquarters. These orders, which are numbered consecutively, are made out in triplicate on white, yellow, and green sheets. The white form is sent to the office of the Maintenance Engineer; the yellow sheet remains in the garage; and the green copy goes to the stock room. There the clerk makes out a stock issue slip, also in triplicate, indicating any parts that may be needed in the repairs.

The repair order eventually gives a complete story on the work that is done: the date, operation, mechanic's and helper's names and the time they spent on the job, the materials used and their cost, together with a summary showing the complete cost of the repairs. At the top of the sheet is such pertinent information as the unit number, make, type, registration number, department, mileage in and out of the shop, when received, and when finished.

The yellow sheets are filed in the foreman's office in the folder that has been assigned to that particular unit; in this way, the total amount of repairs on any one piece of equipment can be ascertained by a quick glance through the files. When work is done for other departments, a record of such repairs is also kept on file. No matter why a truck is sent to the garage, the brakes and steering apparatus are always checked, inspected, and approved, before that unit is permitted to leave the shop.

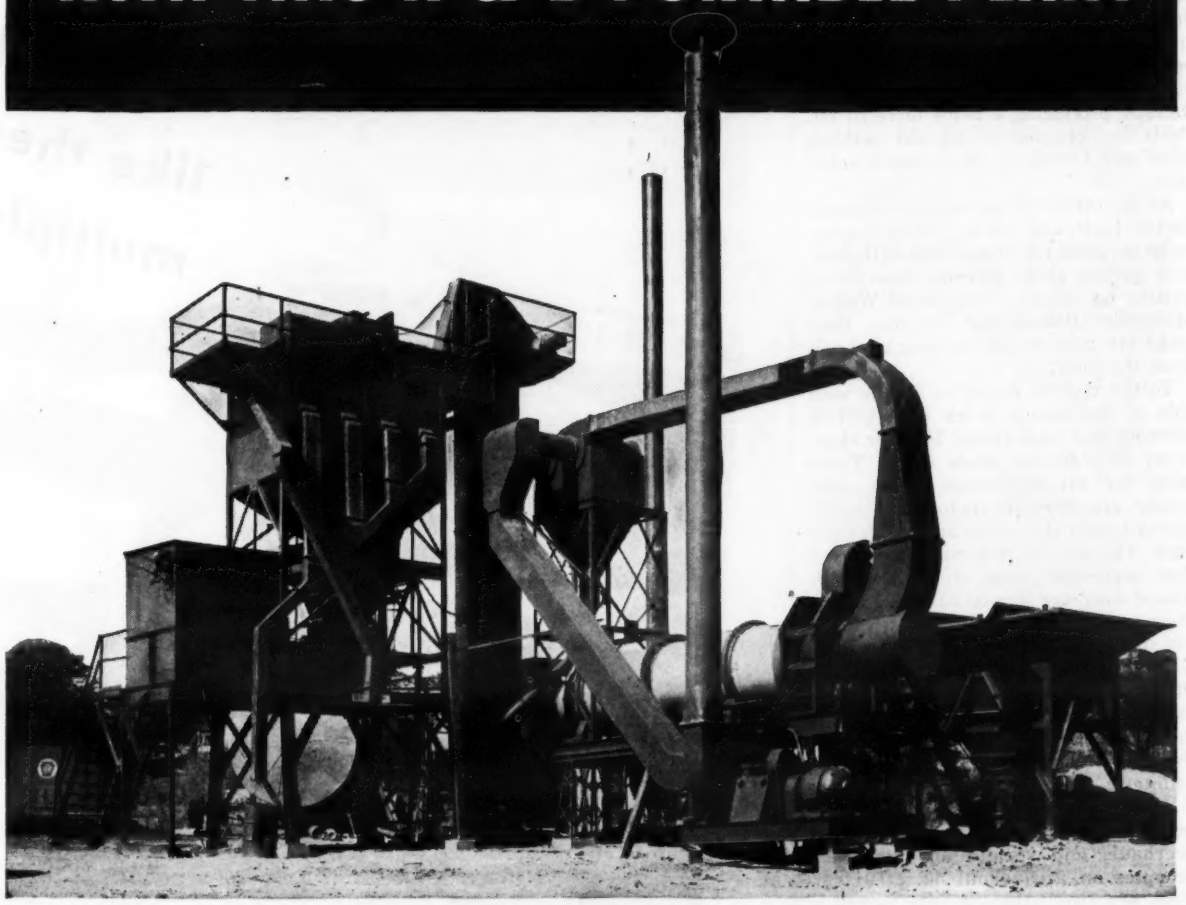
(*Continued on next page*)

C. & E. M. Photo

Maintenance equipment of the Rhode Island Department of Public Works is serviced at the Central Garage in Providence. It is shown here from the south side, fronting Okie Street. The shack at the left houses a gasoline pump.

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
COMPLETE
MACHINERY & EQUIPMENT CO., Inc.
Dept. C
36-40 11th St., Long Island City, N.Y.
Tel. IRonsides 6-8800

74 TONS OF HOT MIX PER HOUR WITH THIS H & B PORTABLE PLANT



The Hetherington & Berner portable asphalt plant pictured above, recently installed by the West Virginia Black Rock Co., of Charleston, W. Va., has averaged better than 74 tons of hot mix per hour. This is a PA-20 plant, with all-electric drive—wired complete at the H & B factory.

Hetherington & Berner builds two types of portable asphalt plants: Model P-A, designed for the contractor who moves frequently and who must be able to get efficient production on small as well as large jobs; and Model P-E (electrically driven), recommended especially for contractors who do not ordinarily move more than once or twice a season. Both types are completely portable and incorporate many advanced features of design that insure dependable, economical and uniform production.

New literature describing both of these types of portable plants, H & B stationary plants, and the new H & B Moto-Paver—the complete traveling mixer and paver—will be sent on request.

MOTO-PAVER
The Complete Traveling Mixer and Paver

Here, for the first time, is a self-contained, single unit machine which accomplishes the mixing and laying in one continuous operation. The Moto-Paver delivers the mixed material spread and struck off on the road surface, ready for rolling. Bulletin MP-47, which gives complete information and specifications, sent on request.

HETHERINGTON & BERNER INC., 731 Kentucky Avenue, Indianapolis 7, Indiana

C. & E. M. Photo
Foreman William Wilkins of the Rhode Island Central Garage checks mechanic Isaac Bonford as he bores the cylinder block of a truck engine with a Van Norman boring bar.

Equipment Serviced At Central Garage

(Continued from preceding page)

Inside the Shop

Inside the front of the shop between the two entrances is a water line and hose for washing equipment, and a floor drain for carrying away the water. The city water pressure is increased by connecting the hose line to a Worthington 3-cylinder electrically driven pump, thereby producing a more forceful jet. Parts are cleaned in an old bathtub filled with Oakite or other caustic solutions.

At the center of the shop is a Rotary 20-ton hydraulic lift on which equipment is raised for lubricating with Alemite grease guns. For tire repairs or putting on chains, a couple of Walker hydraulic Roll-a-Car 2½-ton floor jacks are used to lift the truck wheels from the floor.

To the rear of the office on the west side of the garage is an 18 x 12-foot lavatory and wash room. Further along is an 18 x 50-foot stock room. There parts for all equipment, other than trucks, are stored in metal bins clearly marked with the name and size of the part. The name of the manufacturer of that particular piece of equipment is placed over the section of bins holding those parts. Across on the east side of the shop is another stock room, 18 x 69 feet, where parts for trucks are kept. The name of the truck is placed over each section of bins so that the requisitioned pieces can be quickly reached by the clerk and dispensed over the counter.

At the northwest corner of the building is the machine shop where major overhauls and repairs are made. It occupies an area about 40 x 50 feet. Here are two lathes, a Star 9-inch x 5-foot and a Hill 18-inch x 8-foot; both are driven off a belt turned by a 10-hp electric motor. Also operated by the belt are a Champion 20-inch drill press, a Becker No. 25 milling machine, a 24-inch grindstone, a 12-inch grinder, and a Hendey 16-inch crank shaper.

Along the west and north walls of this section wooden workbenches are set up. On these are mounted vises, an arbor press, and a Sioux valve refacer. At frequent intervals are electric and compressed-air outlets for the convenience of the mechanics. Air is supplied by a Brunner compressor, which is set up in the basement of the Maintenance Department headquarters across the street, and piped into the shop. An auxiliary pump with a storage tank stands ready to be connected to the belt-driven shaft should the compressor fail.

In the center of the machine shop is a jib crane with a 12-foot boom. From it is hung a Cyclone 5-ton hoist for moving and lifting heavy machinery such as truck engines. Engines are placed on wooden stands or adjustable metal benches when they are being overhauled. Cylinder blocks are bored with a Van Norman boring bar, 2½ to 5-inch range. And pistons are ground with a Van Norman No. 101 automatic piston grinder which turns and grinds the piston at the same time.

Also located in the machine-shop area are a Van Norman No. 303 Senior brake-drum lathe; a Chicago riveting machine for relining brakes; a Manley 70-ton hydraulic press which ordinarily is employed to press gears off shafts, but with a special attachment is used for removing tires that are "frozen" to the rims; and two Walker transmission jacks.

Tires are stored in the northeast corner of the garage where there is a 3 x 12-foot metal-top workbench for small repairs. Towards the front of the building on the east side, metal oil drums are stored.

At the southeast corner of the garage is a 15 x 18-foot electrical shop where batteries, generators, starters, etc., are serviced. As many as 12 batteries can be charged at a time on a Baldor Handy battery charger. Included in the equipment is a portable testing unit for checking coils, armatures, condensers, distributors, etc. Spark plugs are gone over with an AC spark-plug cleaner. A workbench with a vise rounds out the section.

Safety against fire is stressed by having the gasoline pump located outside the shop in a small shanty off the southwest corner of the building. The shop is also protected by a large fire extinguisher mounted on a 2-wheel carriage which can be quickly wheeled to any part of the building, and by numerous smaller extinguishers hung around on the walls. Three watchmen, working

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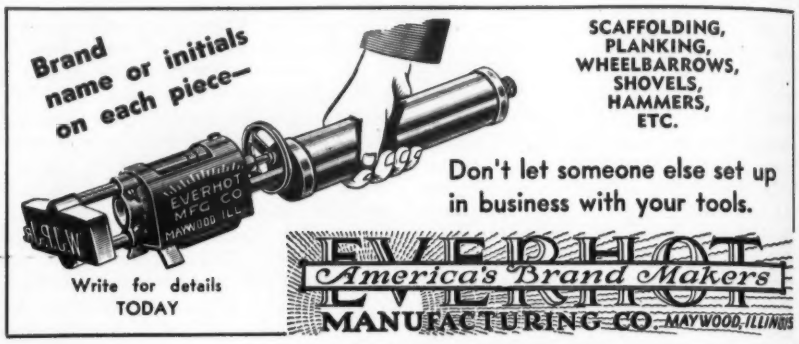
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EVERHOT MFG CO MAYWOOD ILL.
SCAFFOLDING, PLANKING, WHEELBARROWS, SHOVELS, HAMMERS, ETC.
Don't let someone else set up in business with your tools.
Write for details TODAY
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America's Brand Makers
MANUFACTURING CO. MAYWOOD, ILLINOIS

Stanolube HD

FLEET OPERATORS have put Stanolube HD in many tough spots—on heavy tonnage coal trucks in continuous operation, on large inter-city and bus fleets, on taxi operation and in door-to-door delivery service. In every type of service Stanolube HD has helped reduce engine maintenance—lengthened time between overhauls, reduced sludge, eliminated varnish and ring sticking.

Give a break to your hard-worked fleet engines . . . and to your maintenance men . . . and your pocketbook. Test Stanolube HD where you can compare its performance with that of oils previously used or with other oils now operating in your fleet. A Standard Oil Automotive Engineer will help you make a test. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Equipment Serviced At Central Garage

(Continued from preceding page)

8-hour shifts, patrol the buildings and grounds every hour of the day and night.

Other Buildings

On the west side of the garage is a parking field for employees. On the east is a corrugated-metal shed, 75 feet wide x 100 feet deep, used for the storage of heavy and bulky material and equipment. The building has a concrete floor, with light steel trusses to support the metal roof; it was used as an airplane hangar back in the days of World War I. It now houses such diversified objects as plows, moldboards, shovels, hoes, springs, tires, tubes, and tire chains.

Across the street is the maintenance building where the Maintenance Engineer has his headquarters on the second floor. This steel and brick structure measures 125 x 80 feet, and has space on the ground floor for the storage of big trucks and tractors. Along the north side is a 20 x 60-foot carpenter shop where signs are made, road hones built, truck cabs repaired, and general woodworking done.

Equipment includes three Famous machines: a 30-inch band saw, a mortiser with a range from ¼ to ¾ inch, and a table saw 4 feet long and using blades up to 20 inches in diameter. Oliver tools are likewise used: a drill from 1/16 to ½ inch; a 12-inch jointer and planer; a Long Table swing saw, 16 feet x 15 inches, using 12 to 16-inch blades; and a tool grinder for hollow grinding, equipped with 6-inch wheels. Other equipment includes a Take-About 4-inch electric sander, and a bench molding machine with various-sized cutters.

After the signs are made in the carpenter shop, they go to a 20-foot-square room for painting which is done with DeVilbiss spray guns. The paint shop is equipped with an exhaust fan for drawing off the fumes and paint spray. Then the signs are lettered in an adjoining 20 x 40-foot room and are ready for installation.

Behind the maintenance building is a 150 x 200-foot storage yard at the far end of which is the blacksmith shop. This is a 12 x 25-foot wood building with a tin roof. It contains a 4-foot-square forge with an electric blower, a 190-pound anvil, and an oxyacetylene welding set. This shop has a 50 x 80-foot yard for storage.

C. & E. M. Photo

In the carpenter shop of the Rhode Island Central Garage, Frank C. Ihley rips 2 x 4's into strips on a Famous 4-foot table saw equipped with a 14-inch-diameter blade.

Personnel

The Central Garage employs a foreman, 12 mechanics, 4 mechanic's helpers, and 2 stock clerks, besides the 3 watchmen. At the smaller Belleville garage a foreman, 5 mechanics, and 2 mechanic's helpers are employed. Williams Wilkins is Garage Foreman at the Okie Street Central Garage and Dennis F. Bristow is Maintenance Engineer. George H. Henderson is Principal Highway Engineer, and H. C. Thierfelder is Senior Highway Engineer for the Rhode Island Department of Public Works. Daniel J. Ryan is Director of Public Works.

Accidents on the job are both costly and unnecessary. See the article on page 37 on employee training to insure greater job safety.

New Bulldozer-Shovel

A new combination bulldozer and shovel has just been announced by The Frank G. Hough Co., 641 Killebrew, Libertyville, Ill. Mounted on the wide-track International T-9 or TD-9 Trac-TracTor, the Model 9-A bulldozer will handle regular heavy-duty bulldozing work consistent with the size of the tractor.

The blade and the shovel attachment are hydraulically controlled by a front-mounted pump. Double-acting rams control upward and downward operation of the blade. The bucket has a 1-yard capacity, with digging-pitch adjustments of ½, 1½, or 3 degrees. Extra-long reach and forward crowding action are claimed for the machine; its balance is a special feature, according to the manufacturer, since the bulldozer-shovel and tractor are engineered as a unit.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 11.

PMCO

America's Most Complete Line of Material Handling Buckets

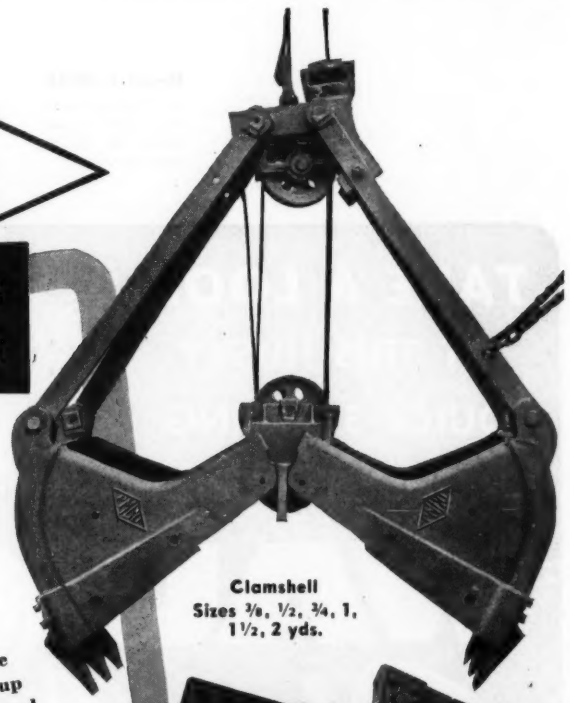
All purpose
- SHOVEL
- PULLSHOVEL
- DRAGLINE
- CLAMSHELL

• FRONTS, BOTTOMS, SCOOPS AND TEETH are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

On the ½ yd. and ¾ yd. Shovel, Pullshovel and Dragline Buckets, all teeth are interchangeable—a great advantage to operators.

Experience Counts

See your shovel man or equipment dealer about PMCO Buckets and Dippers.



Clamshell
Sizes ⅜, ½, ¾, 1, 1½, 2 yds.

Pullshovel
Outside Cutter Widths:
26"—31"—36"—39"

Dragline
All Purpose Sizes ⅜ to 2 yds.
Stripping sizes 2 to 9 yds.

Shovel
Sizes ⅜ to 18 yds.

"Quality Since 1880"

PETTIBONE MULLIKEN CORP. CHICAGO 51, U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

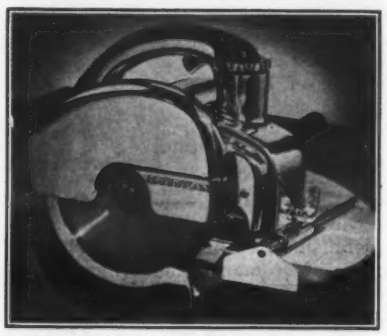
Hand Saw Features Jerk-Free Starting

A one-hand portable saw for use in construction and maintenance is now available. It was designed and developed by The American Floor Surfacing Machine Co., 539 So. St. Clair St., Toledo 4, Ohio.

The saw is powered by a General Electric motor developing 1½ hp with direct-power gear drive to the 8-inch blade, which runs at 6,500 rpm. It is stated that the balanced torque design of this saw permits it to start smoothly without jerk or jar.

The blade will make a 2⅞-inch straight cut, and will saw a 2-inch plank with a 45-degree angle cut. Another feature is an elevating mechanism which employs a 20-degree Acme triple-thread screw for adjustment of the depth of cut.

Designed for one-hand operation, the saw has a plastic auxiliary handle that can be used on vertical cuts, and to pull the saw through at the end of a cut.



This portable saw designed for one-hand operation has a free running speed of 6,500 rpm, will make a 2⅞-inch straight cut, and saw a 2-inch plank with a 45-degree angle cut. It is made by The American Floor Surfacing Machine Co., of Toledo, Ohio.

The operating handle is always parallel to the plane being cut. It is equipped with a telescoping guard, which can be retracted and locked out of the way when not needed. The tool has a small blower which blows dust away from the line of work. It is constructed with SKF Red Seal bearings, lifetime lubricated.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 6.

Officers for Toncan Assn.

Officers were elected at the recently concluded national meeting of the Toncan Culvert Manufacturers Association. The Association is composed of representatives of fabricating companies who use Toncan iron, a product of Republic Steel Corp., in building culverts and other drainage products. Headquarters are in Cleveland.

K. A. Johnson, President of the Wisconsin Culvert Co., Madison, Wis., was elected President; F. V. Romig, Vice President of Beall Pipe & Tank Corp., Portland, Oreg., was elected Vice President; and Harold J. Bair, President, Empire State Culvert Assn., Groton, N.Y., was elected Secretary and Treasurer.

Model 6-WAKD
Six cylinders, 6¼" x 6½", 1197 cu. in. displ., 225 hp. at 1600 rpm.
TAKE A LOOK
AT THIS HUSKY
QUICK-STARTING
HIGHLY FLEXIBLE
WAUKESHA
Diesel
for HEAVY-DUTY
INDUSTRIAL SERVICE
Shovels, Air Compressors, Oil Field Drilling, Off-Highway Trucking, Crawler Tractors, Logging, Saw Mills, Cotton Gins, Irrigation Pumps, Water Supply, Electric Power Generation, and Heavy Construction Machinery of all kinds.

● This big, new, four-cycle Waukesha Diesel is packed with *performance proved* features that give super power, smoothness and acceleration, high fuel economy, and longer life with lower upkeep.

These modern construction and design features include: Large, seven-bearing crankshaft, with hardened crankpins and main bearings testing to 600 Brinell; vibration dampener; removable, wet-sleeve cylinders hardened to 350-400 Brinell; aluminum pistons with six rings (4 non-sticking, wedge-type; 2 straight side oil control rings, and with top ring chrome plated for long life); rifle-drilled connecting rods—I-beam section with deeply ribbed caps held by four heat-treated cap bolts; precision-type, steel-backed, heavy-duty, Diesel-design main bearings; intake and exhaust valves of chrome silicon alloy with hardened exhaust seat inserts; full pressure lubrication by outside mounted positive gear-type pump; large capacity oil cooler mounted on cylinder block; American Bosch injection pump; 24-volt electric starting system, with glow plugs, or gasoline starting engine.

Consult Waukesha engineers about your special problems and engine needs.

WAUKESHA MOTOR COMPANY • WAUKESHA, WIS.
NEW YORK • TULSA • LOS ANGELES

NEW CO… STOODY SELF-HARDENING
for …d-facing all heavy equipment

1. FASTER APPLICATION
2. NO SLAG INTERFERENCE
3. AC-DC APPLICATION
4. SELF-LIFTING SLAG
5. WIDE AMPERAGE LATITUDE
6. COMPLETE UNIFORMITY
7. FREEDOM FROM MOISTURE ABSORPTION
8. CAN BE WELDED IN ALL POSITIONS
9. EQUAL HARDNESS ON MULTIPLE DEPOSITS

New EXTRUSION COATED STOODY SELF-HARDENING

retains its original hardness and wear resistance, yet possesses even better weldability!

Try 50 lbs. today—no increase in price! Available in ¼", 3/16", 5/32" and ⅛" rod diameters. Over 600 U. S. dealers.

FREE: STOODY GUIDE BOOK. 125 practical ways to increase equipment life with hard-facing.

STOODY COMPANY
1136 W. SLAUSON AVE., WHITTIER, CALIF.
STOODY HARD-FACING ALLOYS
Retard Wear … Save Repair

CONTRACTORS AND ENGINEERS MONTHLY
470 Fourth Avenue, New York 16

Enclosed is my remittance of $3 for the next twelve issues of CONTRACTORS AND ENGINEERS MONTHLY.

Name _____

Position _____
(Or Type of Business)

Address _____

(City) _____
N. B., Cash, check or postage stamps will be entirely acceptable.

New Bridge Replaces Damaged Structure

Concrete Abutments and Piers Poured With Paver And Truck-Mixers; Deck Slab on Steel Beams

+ THE New York State Department of Public Works is building a new bridge to carry State Route 203 over Valatie Kill in the village of Valatie, Columbia County, N. Y. A contract for the work was awarded to Cedric Wood, a Buffalo, N. Y., contractor. His low bid of $152,-203.00 also includes the approaches of 30-foot concrete, 8 inches thick. The total length of the project is 0.14 mile with the new triple-span 222-foot bridge at the center.

The original reinforced-concrete bridge was built at the same site in 1923 by the Town of Kinderhook. But when the great floods of 1927 and 1938 backed up the Valatie Kill from its confluence with Kinderhook Creek about 400 feet below the bridge, they undermined the pier footings. The bridge was not lost, however, and the damage caused by the swirling waters was repaired in both instances. But later, uneven settlement caused fractures over portions of the superstructure and made a new bridge a necessity. Work started on the contract the latter part of April, 1946, but because of delays occasioned by material shortages the structure will not be completed until 1947.

The original structure was a trestle design with twelve 20-foot reinforced-concrete spans supported on concrete pier bents. About 400 feet above the bridge is a dam which supplies power for a textile mill located on the west bank of the Kill. This controls the flow of water, which ordinarily is about 20 feet wide and from 2 to 3 feet deep; the exception is during heavy rains or high water when the flatlands are flooded and the backwaters are rising. At such times the pier layout of the original structure was a disadvantage, since the piers were erected at right angles to the road and thus permitted the stream to strike them almost broadside.

In the present design the bridge is constructed on a 35-degree skew, the same angle that the stream flowing through the gorge makes with the highway; thus the channel is confined between the two piers.

Between piers the center to center of bearing distance is 80 feet, with the north span 68 feet and the south span 72 feet. As a further measure to keep the Kill within bounds, concrete walls were extended from each pier north towards the dam. From the east pier, No. 1, the wall runs out 75 feet from the footing in the same line until it meets the rocky side of the ravine. The west pier, No. 2, has a wall cutting back 28 feet at an angle to tie in to an existing concrete wall.

Temporary Bridge

Since the new structure was to oc-

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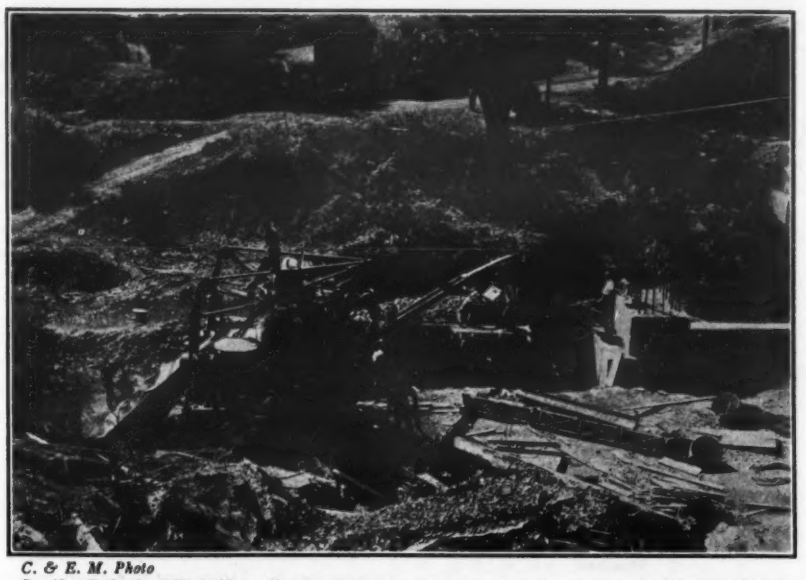

C. & E. M. Photo

On the Valatie Kill bridge, the lower part of a pour into the wall form is completed. Here a ¼-yard bucket, traveling along the extended boom of a Koehring 27-E paver, deposits concrete in higher lifts.

RUBBERIZED ASPHALT

(FEDERAL SPECIFICATIONS SS-F-336)

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UNDER AUTOMATIC THERMOSTATIC CONTROL

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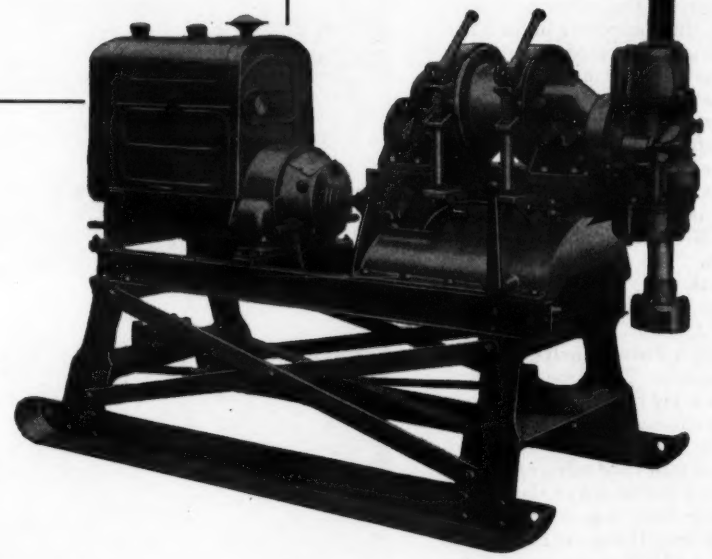

CP Gasoline-Driven Diamond Core Drill

Specifically designed for drilling and standpiping jobs where the "going is tough," the ruggedly built CP No. 8 gasoline driven DIAMOND CORE DRILL has a capacity of 900 feet with E-EX Fittings.

It meets every requirement for making test borings, for mineral prospecting from the surface, and for shallow oil structure drilling in all formations.

Skid-mounted, on a substantial steel frame, the drill is readily moved from hole to hole under its own power.

When drilling at the continuous high speeds made possible by bortz bits, it gives maximum performance with low maintenance.

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C. & E. M. Photo
This 17-foot structural-steel tower was erected for high concrete pours at pier 2 of Valatie Kill bridge. The Chicago boom or stiffleg derrick attached to it handled forms and lifted a concrete bucket.

New Bridge Replaces Damaged Structure

(Continued from preceding page)

cupy the same site as the old, a temporary bridge had to be erected. A natural location for this span was available north of the existing bridge about halfway to the dam; there Valatie's Main Street once crossed the Kill on a still earlier bridge. The old masonry abutments were in good shape to help bear the load of the structural-steel trestle which the contractor built. The original plans suggested a timber bridge, but as material proved difficult to obtain, a structure of steel was erected instead.

Steel members were obtained from the Carnegie-Illinois Steel Corp. It shipped them from its Pittsburgh plant to a siding of the Boston & Albany railroad at Niverville, about 3 miles from the job. The gondola cars were unloaded with the help of a 15-foot A-frame; this was mounted on the back of a Dodge 1½-ton truck which was equipped with a Tulsa winch rigged up in back of the cab. The same truck and winch played a big part in several other phases of the contract.

At the site, the steel was unloaded and assembled into four bents spaced at 18 feet, making the length of the bridge 90 feet. Each bent was made up of four posts—8-inch H-beams from 18 to 22 feet high—which were capped by 24-foot 10-inch WF 33-pound beams welded to the flanges of the posts. Job welding was done by a local welder from the village who used a Westinghouse ac welder operated from a nearby power line.

Holes were drilled into the rocky bed of the stream with a couple of Ingersoll-Rand pavement breakers driven by an I-R 105-cfm air compressor. The assembled bent was laid on the ground with the bottoms of the posts next to the holes; a cable was then passed from the foot of the posts to a deadman on a tree along the south bank of the stream. The Dodge truck backed up on the old north abutment and a line was strung from the winch to the top of the first bent lying on the ground. A sheave was fastened at the corner of the masonry so that the winch could easily lift the bent into position with the posts slipping into the anchor holes cut out of the rock.

The truck winch was then used to slide out the 12-inch WF 25-pound I-beams which served as stringers. The two outer stringers were set in place first, followed by the six intermediate members on a 2½-foot spacing center to center; the entire structure was tied together by welding. The same procedure was followed for each additional bent.

After erection, the bents were cross-braced longitudinally. Stanley clips were slipped on the flanges of the I-beam stringers so that the 4-inch plank deck would have a stable anchorage. The bridge floor provided an 18-foot roadway and a 5-foot walk on one side with a guard rail along both edges. A 54-inch steel flume from the mill dam passes under the south span of the temporary bridge. On both sides of the temporary bridge, approach roads of bituminous macadam on a gravel base were constructed to tie back in to the main road.

Excavation

With two-way traffic now taken care of on the temporary steel structure, the old reinforced-concrete bridge was razed to make way for the new span. Across each bent the three intermediate T-beams were cut through with the pneumatic jackhammers, and the reinforcing steel severed with an oxyacetylene torch. Holes were drilled in the outer beams and charged with a couple of sticks of du Pont 40 per cent dynamite. The resulting blast sent each span and piers toppling to the riverbed below.

Only from the center 80 feet did the rubble have to be cleared, since a fill

(Continued on next page)

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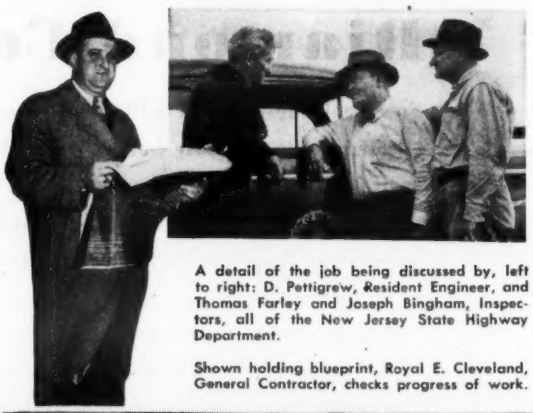
DEWEY AND ALMY CHEMICAL COMPANY
CAMBRIDGE 40, MASS.

Widening the World's Busiest Highway

Bethlehem Bar Mats awaiting placement. Though less than a mile in length, this job called for approximately 52,000 sq yd of mats.

Showing ease with which two men can handle Bethlehem Bar Mats. Note heavy vehicular traffic along original highway at right.



A detail of the job being discussed by, left to right: D. Pettigrew, Resident Engineer, and Thomas Farley and Joseph Bingham, Inspectors, all of the New Jersey State Highway Department.

Shown holding blueprint, Royal E. Cleveland, General Contractor, checks progress of work.

There's good reason for widening the world's busiest highway—New Jersey's Route 25, in the vicinity of Newark Airport—from four to eight lanes. Originally designed to whisk cars to and from New York at the rate of 36,000 per day, this all-important traffic route has long been carrying an average of 60,000 cars daily, with occasional 24-hour holiday traffic topping the 100,000 mark.

These pictures were taken recently along the 0.85 mile Section 32A, one of two sections built for the New Jersey State Highway Department by Robert W. Cleveland Company, East Orange, N. J. Bar mats, dowels and cable guard rail were supplied by Bethlehem.

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BETHLEHEM STEEL

STEEL for HIGHWAYS

Smoothing operation prior to final brushing. Highway engineers estimate that by 1950, Route 25 may carry close to 75,000 cars daily.

New Bridge Replaces Damaged Structure

(*Continued from preceding page*)

will be placed from the top of each abutment to the foot of the next pier. The slope fill will be roughly 2 to 1 and will cover the remains of the old bridge. But between the piers and abutments, considerable work was required to break up the rubble, eliminate voids in it, and, in general, obtain a compact embankment.

Excavation then got under way for the two pier footings which are founded on solid rock. The bulk of the digging was in brittle shale. This was found unsuitable to the use of dynamite, since an experimental blast shattered a considerable area. Consequently three other methods were used in excavating for the footings, 8 feet below the stream channel for pier 1 and 4 feet below for pier 2.

A Lorain ¾-yard shovel was used at the start. But as the holes got deeper, efforts were made to hold them to neat lines so that the footings could be poured directly in the shale without the use of forms. A Sauerman ½-yard bucket was then hooked up to the truck and winch and used as a dragline, with good results especially in some strata of soft clay and muck which were encountered. Further down in harder strata again, the pneumatic tools were equipped with clay spades which bit out large chunks of the hardpan to be cast out by hand.

The tops of the pier footings at elevation 214 are 10 feet wide x 10 feet long; their bases range from elevation 196 to 204, according to the amount of material that had to be excavated until rock was finally reached. Where the footings extend above the shaly rock, wooden forms were used, with plywood in front and rough lumber at the rear where the fill goes down to cover the exposed concrete. A 4-foot-high lift is built up on top of the footings on which the two pier stems rest. This measures 8.21 x 5.75 feet. The stems are 18 feet high, spaced 30.67 feet on centers. Each measures 7.21 x 4.75 feet at the bottom and 4.21 x 3.75 feet at the top. The piers are connected by a breast wall the same height as the footing; it varies in thickness at the bottom from 5 to 12 feet, according to the depth required to reach rock.

Form work for the structures above the footings consisted of ⅝-inch plywood backed by 2 x 6 studs on 14-inch centers. Some car-flooring material in 10-foot lengths, the width of a railroad car, was obtained for this purpose and served the job well for good sturdy supports. For wales the contractor used double 4-inch steel channels. These were spot-welded at the corner joints to assure rigidity of the structure during the pouring operations. Spacing varied from 3 to 4 feet according to the location and the weight to be sustained. The forms were strengthened further with ¾-inch Richmond tie screws on 4-foot centers. A SkilSaw was used in cutting lumber for the form work.

Batch Plant

Because of the scarcity of labor, small sectional pours were handled by truck-mixers. The concrete was purchased from A. Colarusso & Son of Hudson, N. Y., and delivered to the job after a 15-mile haul. This sufficed for volume pours under 30 yards. But for the larger pours the contractor set up a batch plant and mixed concrete in a Koehring 27-E paver for pours up to 70 cubic yards.

The batch plant consisted of three wooden chutes built side by side into the hill just south of the bridge on the east bank of the Kill. The chutes were 8 feet wide, and were loaded from the top of the hill at street level with sand and two grades of stone; material was purchased from local dealers. The sand was usually slid down the wooden floor of the chute readily enough, but the stone did not move so easily.

During pouring operations three or four men worked at the bottom of the chutes to shovel the material towards the outlet. The stone was pulled down the incline in each chute by a ⅛-yard bucket hooked up to the niggerhead on the winch. The winch truck was stationed at the top of the hill. From the winch a rope passed around a horizontal sheave fastened to a post at the top of the chutes. The rope connected to the buckets and to another sheave at the bottom of the sloping bins. The winch operator moved the bucket up or down the incline according to the directions of a helper who observed the movement of the aggregate. Thus the lower parts of the chutes were always kept full of material when needed for the pour.

The sand and stone batches were weighed out in an Erie 1-yard Aggre-Meter with beam scales hung just below the outlet of the chutes. The aggregate was discharged as a single batch into a Ford dump truck which backed under the bin for a load. The truck then drove to the paver. It stopped on the way to pick up the one bag of natural cement which was added to make a denser mix, more durable concrete, and to prevent scaling. At the paver 6 bags of Universal Atlas portland cement were added. The portland cement came from a plant in Hudson, while the natural variety was procured from Century Cement Mfg. Co., Inc., Rosendale Mill at Rosendale, N. Y.

When the paver was working on the west bank of the stream, the batch truck crossed over on a timber-crib bridge with plank flooring which the contractor built directly in front of the batch

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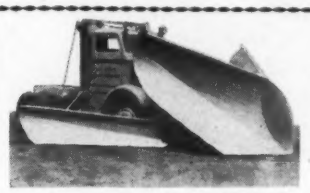

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For the Bituminous — mix Calculator — a ready reference slide rule showing weight of mix needed in lbs. and tons in relation to width and depth of area to be covered.

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TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM-PLANTS

New Bridge Replaces Damaged Structure

(*Continued from preceding page*)

plant and just south of the new structure.

Concreting Operations

The mix used approximated 1:1½-2:3 proportions, and the 7-bag batch yielded an average of 33.1 cubic feet of concrete. For each bag of cement 5 gallons of water was added; it was tapped in from the village hydrants. This mix produced a 2½-inch slump. A typical batch by weight is as follows:

Cement, natural	80 lbs.
Cement, portland	564 lbs.
Sand	1,628 lbs.
Stone, Nos. 1 and 2	1,323 lbs.
Stone, No. 3A	1,323 lbs.
Water	35 gals.

In the combination Nos. 1 and 2 stone which took up one of the chutes, 45 per cent was No. 1 and 55 per cent was No. 2. The gradation of the aggregate was as follows:

	Per Cent Passing			
Sieve Size	Sand	No. 1 Stone	No. 2 Stone	No. 3A Stone
2¼-inch	....	....	....	100
1¾-inch	....	....	100	90-100
1-inch	....	100	90-100	0-15
½-inch	....	90-100	0-15	....
¼-inch	100	0-15	....	....
No. 4	90-100	....	....	....
No. 14	55-75	....	....	....
No. 48	10-25	....	....	....
No. 100	2-8	....	....	....

The footings were kept unwatered during the concreting with two pumps, a Gorman-Rupp 3-inch and a Carver 1½-inch. When the pours were low, the concrete was chuted out of the paver drum into the forms. But as the lifts increased and the forms rose higher, the bucket and boom were used for placing the mix. A 12-foot extension was added to the paver boom, increasing its length from 18 to 30 feet, and a smaller bucket of ¼-yard size was used. This slid down the boom by gravity and was pulled back by a rope.

The paver boom, and at certain times the concrete chute, was supported by a high line. This was a ⅞-inch cable running the length of the bridge along the center line, tethered to a tree at the north end and to a catch basin at the south end. Off this 280-foot line a smaller ⅝-inch line ran west for approximately 120 feet from about the center of the project. This line was also anchored to a tree, and by means of a block and tackle hook-up either the boom or chute was suspended at whatever point the work was in progress.

For the higher pier pours a structural-steel frame was erected 17 feet high and measuring 6 x 10 feet at the base. The posts were double 4-inch channels while the bracing was single same-size members. About halfway up this tower a Chicago boom or stiffleg derrick was attached; it was made of a piece of 4-inch tubing 18 feet long, taken from an old boiler. Through a sheave at the tip of the boom, a ¼-yard bucket of concrete was easily lifted and dumped into the high forms.

Reinforcing steel for the piers and abutments came from the Bethlehem Steel Co. plant at Elizabethport, N. J., and was shipped to the B & A railroad siding at Niverville. A Marvel vibrator was used to vibrate the concrete as it was placed. Curing was done with wet burlap which was kept on the concrete for 7 days; forms were removed after 2 or 3 days.

The piers were poured first, then the abutments were constructed. The latter are 64 feet long and 4 feet 8 inches wide except at the two buttresses; these measure 18 x 5 feet and rise to a height of 33 feet 7¾ inches where they are capped by another section 5 feet 2¼ inches high. The backs are vertical while the front slope is 3 on 1.

Superstructure

The American Bridge Co. is fabricating and erecting the structural steel for the superstructure. It will consist of six 36-inch 150-pound I-beams for the 68-foot and 72-foot spans, and six 36-inch 170-pound I-beams for the 80-foot center span, set on 7-foot 7-inch centers. These are cross-braced every 20 feet with 15-inch 33.9-pound channels.

C. & E. M. Photo

A Tulsa winch on a Dodge truck operated the buckets in Cedric Wood's aggregate chutes, through sheaves and rope fastened to a niggerhead. It also lifted bents into position for the temporary bridge.

To the top flange of the steel beams, spiral-bar reinforcement is spiral-welded in the field and then embedded in the concrete to form a composite beam. On the exterior beams the spiral is 5 inches in diameter, while on the interior beams it is 5½ inches. The spirals are formed from plain round structural-grade bars, ⅝-inch diameter, furnished by the Bethlehem Steel Co. The top of the flange is first cleaned with a wire brush and the welding done by the electric-arc process using 5/32-inch-diameter electrodes. Two structural welds, 2½ inches long, are made at each point of contact with the beam.

This type of composite construction has been patented by the Porete Mfg. Co. of North Arlington, N. J. It has licensed the N. Y. State Department of Public Works to use such construction. The Department in turn granted a sublicense to the contractor to use this

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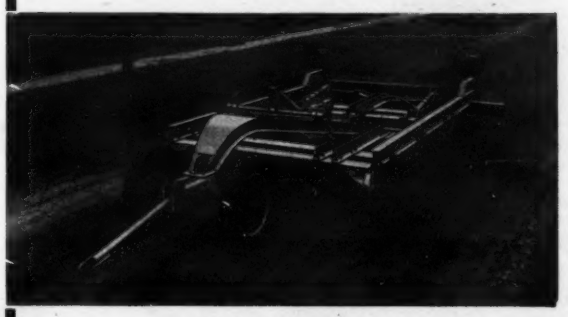
Truk-Patrol With The New BURCH TILTLEV BLADE



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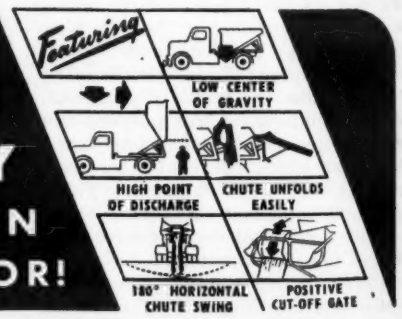

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Even though it costs less in every way, the Dumpcrete is hauling a superior concrete. For air-entrained concrete is more uniform...more workable ... more durable ... can be finished sooner.

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New Bridge Replaces Damaged Structure

(Continued from preceding page)

process on a state project. The contractor has to make provisions in his bid for payment of the royalty, which in this case amounted to $284.90.

The next step is pouring the 7¼-inch concrete slab, followed by a 3-inch concrete pavement, to form a 30-foot roadway with a 5-foot 3½-inch walk on each side protected by a 3-foot 3-inch steel-tube railing. The bridge is designed for H20 loading; this means it will take a 20-ton live load per traffic lane, or the equivalent of a 20-ton truck which is preceded and followed by a 15-ton truck. The approaches are also 30 feet wide; they consist of three 10-foot lanes of 8-inch uniform concrete with a 4-foot 5½-inch sidewalk and a 6½-inch curb on each side.

Quantities and Personnel

The major items in the contract are:

Unclassified excavation	9,500 cu. yds.
Bridge excavation	2,510 cu. yds.
Concrete	1,890 cu. yds.
Steel-bar reinforcement	116,000 lbs.
Spiral-bar reinforcement	4,300 lbs.
Structural steel	298,000 lbs.

The number of men on the contractor's payroll has averaged 15 throughout the job, under the supervision of the contractor, Cedric Wood. A 40-hour work week has been observed. For the New York State Department of Public Works, LeRoy Addis is Engineer in charge. The project is located in the Eighth District which is headed by James S. Bixby, District Engineer, with headquarters at Poughkeepsie. Charles H. Sells is Superintendent of the Department.

New Firm Name for Kelley

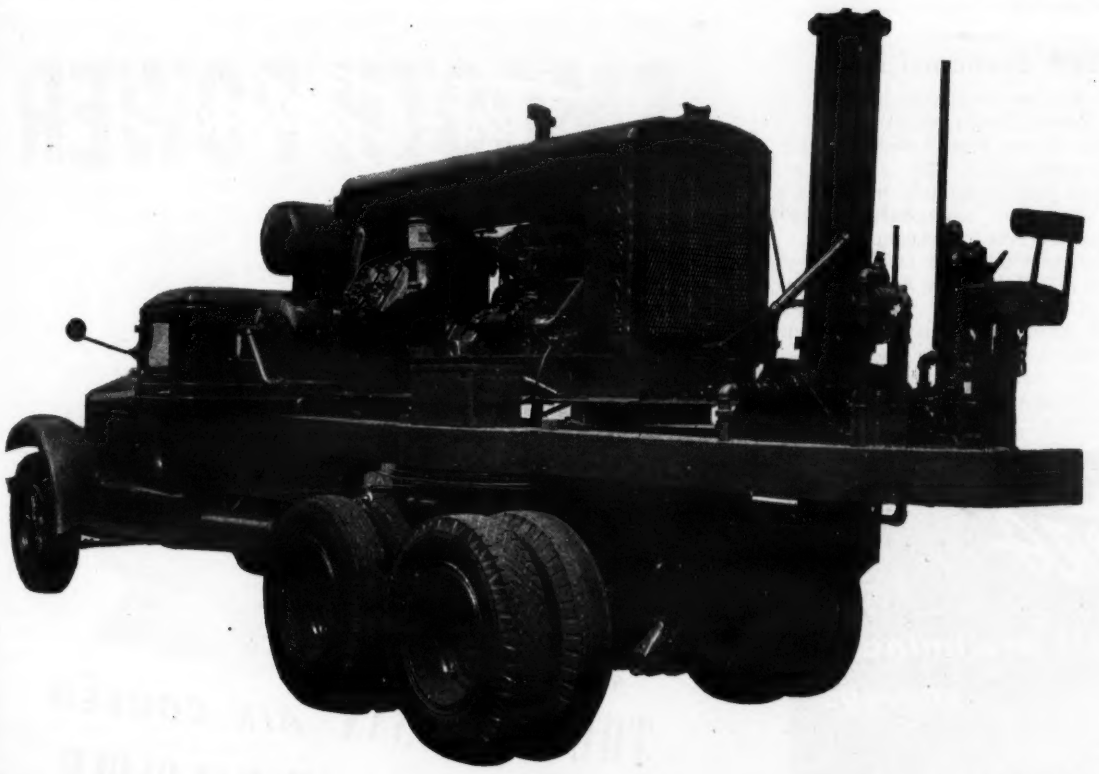
A change in firm name has been announced by E. B. Kelley, Inc., of Philadelphia, distributor of contractor's equipment and supplies and concrete-products machinery. The new name is Cline-Thornton, Inc. Management and personnel will remain the same.

Boring-Equipment Kit

A boring-bar set and holder kit are now being distributed by Bruno Tools, 9330 Santa Monica Blvd., Beverly Hills, Calif., manufacturer of precision cutting tools. The adjustable holder has a capacity of 3/16 to ¾ inch. It is said to grip round, hex, square, or out-of-shape bars as well as drills, reamers, and chucks without the use of adaptors, bushings, or attachments. It is stated by Bruno that the tool is always automatically centered in the holder. The holder may be installed on any 9 or 10-inch swing lathe. Centering height is 1 3/16 inches, and the bottom may be faced off for height adjustment.

Each of the boring bars in the set has one precision-ground high-speed steel threading bit and one blank high-speed steel bit. Standard sizes in the set are ¼, ⅜, and ½ inch, with a ¾-inch bar available on separate order.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 7.



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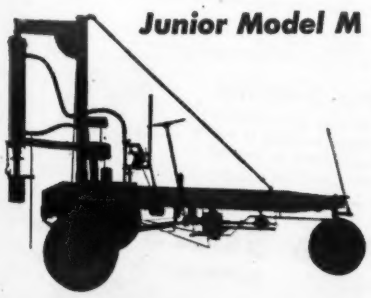
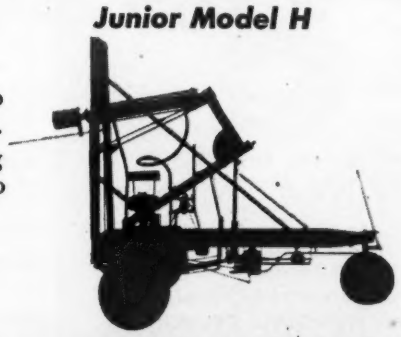
- Heavy-duty machine equipped with air motor which pivots the unit on the truck bed.
- Junior Trailer Models are equipped with air motor that propels machine and swings the boom.

Junior Model M



- Model-H can be converted to vertical machine in 30 minutes.
- Junior Model T for mounting on truck with compressor also available.
- Write for details and prices.

Junior Model H



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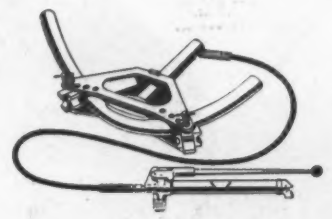

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Dealer's Mobile Shop For Tractor Service

A portable repair shop for use in the field is the latest approach to tractor repair service recently adopted by the Illinois Road Equipment Co., Springfield, Ill., dealer for Allis-Chalmers equipment. The service unit has been mounted on the chassis of an Army 2½-ton 10-wheel truck, and is prepared to effect a complete overhaul job out in the field.

Facilities available on the mobile garage are designed specifically for field service and are of such a nature that repair men are prepared for almost any eventuality. The sides and tail-gate fold out to afford ample bench space on either side of the truck. There is also bench space inside for work in cold weather.

The unit is equipped for electric or gas welding, has a complete set of mechanic's and heavy-duty tools, an electric motor, hydraulic press, gasoline heater, vises, air compressor, electric drills and grinders, and a box of taps and dies. The front end of the truck is rigged with a winch and detachable boom.

The company reports that this piece of equipment has been very favorably received and that it plans to expand this type of service.

CSPA Personnel News

The addition to its technical staff of L. O. Keener has been announced by the Clay Sewer Pipe Association, Inc., of Columbus, Ohio. Mr. Keener will represent the Association in Pennsylvania, from his headquarters at 307 Westminster Ave., Greensburg, Pa.

The Association has established an office at 117 W. Genesee Ave., Saginaw, Mich. C. J. Bauer, Jr., District Engineer of the organization and its Michigan representative for the past six years, will maintain his headquarters at the new address.

Safety by the Packet

Packet folders developed by the National Safety Council's Construction Section, 20 No. Wacker Drive, Chicago 6, Ill., are now available for use by construction companies and maintenance departments.

These folders are designed as an aid in developing a safety-conscious organization. They contain safe-practice pamphlets, construction-detail sheets, safety-instruction cards, posters, and other aids to supervisory personnel. The posters and instruction sheets are amply illustrated with cartoon drawings.

Packet folders are available on the following subjects: first aid, ladders, scaffolds, clearing, demolition, fiber rope and wire rope, excavation, chains and hoisting apparatus, concreting, welding, construction equipment, steel erection, highway construction, and electric-line construction.

Prices for members, when quantities of 1 to 9 packets are purchased, are $1.50 for each packet; 10 to 99 packets, $1.25 each; and quantities of 100 or more, $1.10 each. Prices for non-members are double those given.

Also made available by the organization is a collection of 25 construction-detail sheets. These are actual working drawings for field use in the erection of temporary structures and safety devices. They include scaffold horses, single or double-cleat ladders, drinking-water dispensers, single-pole scaffolds, sidewalk sheds, etc. The set is contained in a pressboard binder, and costs $3.00 for non-members, and $1.50 for members.

New Rex Sales Manager

The appointment of Austin K. Thomas as Sales Manager of its Construction Machinery Division has been announced by the Chain Belt Co. of Milwaukee. Mr. Thomas formerly served in Philadelphia as Eastern District Manager, and during the war was located in Washington, D. C.

Altimeters
for all preliminary surveys
How much money will this instrument save YOU? Preliminary surveys in 1/10th the time with accuracy better than 1 part in 1000.
Type SA-1: Range 4360' (-760' to + 3,600') in intervals of 2'
Type SA-2: Range 10600' (-900' to + 9,700') in intervals of 5'
Type SA-3: Range 15000' (-500' to + 14,500') in intervals of 10'
All models priced $200 complete with case, hand & shoulder straps, magnifier and thermometer. IMMEDIATE DELIVERY —see your dealer or write direct for descriptive folder.
AMERICAN PAULIN SYSTEM
Manufacturers of Precision Instruments
Altimeters

SMOOTH POWER
Two-Cylinder
THE NEW ONAN AIR-COOLED
"CK" ENGINE 10 H.P. 4-CYCLE
Two-cylinder horizontal opposed design gives the new, heavy-duty CK engine unusual running smoothness. Short, rigid crankshaft . . . 2-inch diameter main and 1⅝-inch diameter rod bearings . . . pressure lubrication . . . axial-flow cooling fan . . . aluminum construction giving 4-to-1 cooling advantage over cast iron . . . weighs only 97 pounds and fits neatly into 15" x 19" x 18" space. Designed to solve engine power problems in industry, agriculture and other fields. Proven by thousands in use today . . . now in mass production . . . prompt delivery.
Also has: Built-in precision governor . . . downdraft concentric carburetor for wide-angle operation . . . oil bath air cleaner . . . fuel pump . . . oil pressure gauge . . . crankcase fumes exhausted to carburetor . . . hermetically sealed magneto ignition coil with easy-to-get-at breaker points, 2-qt. oil capacity.
ONAN ELECTRIC PLANTS—A.C.—350 to 35,000 watts in standard voltages and frequencies, D.C.—600 to 10,000 watts, 115 and 230 volts. Battery chargers —500 to 3,500 watts, 6 to 115 volts.
ONAN AIR-COOLED ENGINES—CK: 2-cylinder opposed, 10 h.p.; BH: 2-cylinder opposed, 5.5 h.p.; 1B: 1-cylinder, 2.5 h.p.
WRITE FOR
Illustrated, complete specifications
Electric Starting
Built-in electric push-button or automatic starting is optional; adds little to overall dimensions.
D. W. ONAN & SONS INC.
3467 Royalston Ave.
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Onan PRODUCTS
ONAN 4-Cycle ENGINES

C. & E. M. Photo
This Bucyrus-Erie 29-T blast-hole drill is moving across country to a new site on the Orr job. On the 156-foot cut in the background is a ripper.

Highway Builders Blast Hard Rock

100-Foot Granite Cuts And 226-Foot Fills Are Spectacular Features of U.S. 70 Realignment Job

✦ RIPPING through towering mountains between Miami and Superior, Ariz., Orr & Orr Construction Co. of Phoenix is blasting 3.3 more miles for the ultimate modernization of transcontinental U. S. 70. With hard granite cuts up to 100 feet deep on the center line of the highway and 160 feet on slopes, plus one fill 226 feet deep from the bottom of a gorge to final grade, the Orr job is one of the most spectacular ever done for the Arizona Highway Department.

When the new 40-foot bituminous-surfaced highway is opened to 60-mile-an-hour traffic about a year from now, some 1.3 miles will have been cut off the length of the present highway, built back in 1921. Then the narrow, crooked, icy, steep road now in use will slip into the limbo of man's puny marks on an eternal mountain. Mountain shrubs will soon grow where heavy, creeping truck traffic now bottles hundreds of impatient automobile drivers on the breath-taking and dangerous road.

Some of the southwest's most colorful history has been written near this job. The forbidding pass, through which U. S. 70 threads, has caused the normal tides of progress to recede many a time. For years white men failed to find a way through the mountains between Globe and Superior. When the Apache Trail was blazed, warring Indian tribes killed many of the pioneers. The old Pony Express Road, still visible below the present highway embankment, was gouged out shortly after the U. S. Army drove the last Apaches from Suicide Leap overlooking the town of Superior.

In 1920 and 1921 the present route was built by contract and prison labor. It was a great achievement for its day. As highway design has improved, however, so has construction equipment. Now the steep and winding highway is all being replaced with the help of Federal Aid funds. The Orr contract for $500,000 is scheduled for completion about 13 months from the starting date of May 9, 1946. Out of the 391,300 cubic yards of excavation in the job, at least 85 per cent is in hard blue granite and diorite.

Proposed realignment of the Superior-Miami Highway at Pinto Creek, Arizona.

Design of Highway

Under the supervision of Arizona's ace mountain-highway planner, E. V. Miller, the present contract was conceived. Starting near the Pinal-Gila County line, the new sector extends east through new terrain. Its alignment limits curvature to a maximum of 6 degrees, and grades to 6 per cent. The

(Continued on next page)

CHILOQUIN, OREGON, JOB OF R. A. HEINTZ CONSTRUCTION COMPANY, PORTLAND, OREGON.

—with a fleet of Wooldridge Terra-Cobras

WOOLDRIDGE TERRA-COBRAS employ the same Bowl features as Wooldridge "Terra-Clipper" tractor-drawn Scrapers

Working on a 7.5 mile stretch of a new 40 mile highway, which will by-pass the crooked snowy Sun Mountain grade, just North of Fort Klamath, Oregon, Wooldridge Terra-Cobras are handling full loads of volcanic boulders, decomposed lava and cinder soil on an 8 minute round-trip cycle, over a distance of 6400 feet. 40 to 60 seconds loading and 30 seconds spreading in distances up to 100 feet contribute to consistent and continuous speed of haul—down and back a 3% grade. Ample traction and power plus positive two-wheel steering insures sure-footed travel at maximum speed every inch of the way. Flexibility of travel and effortless control saves equipment and operator fatigue. To figure on lower yardage costs, figure on using Wooldridge Terra-Cobras. Investigate fully today.

Measure Each Job in terms of WOOLDRIDGE EQUIPMENT:

- ★ High Speed EARTHMOVERS
- ★ Tractor-drawn SCRAPERS
- ★ BULLDOZERS
- ★ TRAILBUILDERS
- ★ RIPPERS
- ★ POWER CONTROLS

WOOLDRIDGE
TERRA COBRA
HIGH SPEED-SELF PROPELLED
EARTHMOVERS

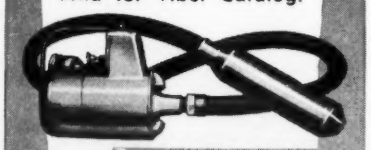
WOOLDRIDGE MANUFACTURING CO.
SUNNYVALE, CALIFORNIA
NATIONWIDE SERVICE

DEPENDABLE

BREAKDOWNS ON BIG CONCRETE JOBS COST MONEY. VIBERS ARE DEPENDABLE.

VIBER
Concrete Vibrators

Jobs can be completed ahead of schedule, with VIBER'S unmatched speed-9,500 RPM, *in concrete*. Send for Viber Catalog.



VIBER COMPANY
SINCE 1931
726 SO. FLOWER STREET
BURBANK, CALIFORNIA
ORIGINATORS OF INTERNAL CONCRETE VIBRATION

New Highway Built Through Hard Rock

(*Continued from preceding page*)

new road will have full transition spirals from tangents to horizontal curves, with limiting superelevations. Vertical curves are designed for proper sight distances. All cut widths are 40 feet, and all full embankment subgrade sections measure 48 feet.

The new road will have a 2½-inch road-mixed bituminous wearing surface 40 feet wide, set on 2 inches of fine and 4 inches of coarse selected base material. The new route was located by N. G. Wallace, a locating engineer who can remember the days around 1930 when rodmen used to jab at wild hogs with their range poles. (He can also probably remember how the hogs got smart and began chasing surveyors, on sight, up rocks and trees!)

While the future connecting bridge across the deep Pinto Creek gorge is not a part of the Orr contract, it will have to be built before the Orr contract can be opened to automobile traffic. A 2-hinge 90-inch solid rib-steel arch with a clear span of approximately 400 feet has been designed. Since it is over 700 feet long, about 150 feet high off the gorge, and lies in a transition spiral and a 1,200-foot vertical curve, its construction is going to be difficult—particularly in view of the fact that falsework will not be practical. That will be another story.

Drilling and Blasting

One of the toughest parts of the Orr contract is the drilling and blasting of rock cuts. Neither W. E. Orr, Sr., nor his son with the same name is a stranger to rock in this state. Most of the completed work on U. S. 70 was done by Orr and son. The same Indians are running jackhammers who applied for jobs with Orr in 1930. But since this job is one of the toughest the Orrs have done, all the knowledge they ever learned is being used in their present technique.

For deep drilling, on holes up to 90 feet, a Model 29-T Bucyrus-Erie blast-hole drill is used with 9-inch bits on a 3,600-pound tool string. Long ago the senior Orr learned the wisdom of drilling and shooting to full depth wherever possible. That is a great part of the secret of blast-hole drill work—that and the fact that a 9-inch hole 50 feet deep will take 22.03 cubic feet of powder, against only 1.77 cubic feet for a 2½-inch hole the same depth.

C. & E. M. Photo

A Bucyrus-Erie 43-B shovel with a 2-yard dipper loads a truck in a heavy rock cut on the Orr & Orr Construction Co. job. Of the 391,300 cubic yards of excavation, at least 85 per cent is in hard blue granite and diorite.

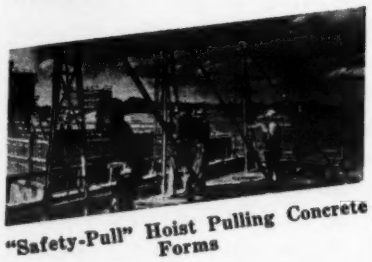
In average digging the 29-T rig is drilling 3 feet per hour, although one particularly tough formation was found where it took 27 hours to drill 16 feet. Rough logs are kept of all large-diameter holes and the loading is governed by the hardness or brittleness of the formation. Seamed formations, of course, take more powder and closer drill centers than the brittle granite.

Hole centers for churn-drill work range from 17 to 25 feet, depending on factors only good rock men can judge in the field. These factors are the depth of cut, the kind of formation, seamy or solid, and the speed of drilling. The deep cuts are removed by trucks and two Bucyrus Erie 43-B shovels, so thorough breakage is needed for the 2-yard dippers to load.

Apache granular powder, 40 per cent strength, is used at an average explo-

(*Continued on next page*)

COFFING HOISTS



"Safety-Pull" Hoist Pulling Concrete Forms

Contractors - Engineers
Superintendents - Foremen

Have long been specifying COFFING "SAFETY-PULL" Ratchet Lever Hoists for all kinds of lifting and pulling jobs in their construction and maintenance work. These light weight, portable time and labor saving hoists are built in capacities ranging from ¾ to 15 tons yet they weigh only 14 to 150 pounds.

WRITE FOR BULLETIN SR-3.

COFFING HOIST CO.
DANVILLE, ILLINOIS

NOW For the first time

ROADSTONE and AGSTONE in one operation!

This portable hammermill plant is another new Cedarapids portable crushing and screening plant that opens up an entirely new market for contractors and quarry operators. The crushing unit is a 4033 or a 3033 Cedarapids Hammermill that will turn out 20 to 40 tons of agstone or 140 to 180 tons of 1½" material per hour depending upon the size of feed and kind of stone. Or—the portable hammermill plant will produce a percentage of each product all in one closed cycle operation. The agstone comes off the delivery conveyor over the end of the plant while the crushed rock comes out on a side delivery conveyor.

In this installation, the rock is going into a five yard portable truck loading bin that acts as a surge between truck loads. Note the separate power unit for the hammermill which permits a change of speed to suit hammermill performance in various kinds of stone.

The Cedarapids Hammermill not only produces a much finer quality and uniform size of material but will turn out more tons per hour than other similar types of pulverizing equipment of comparable size, and with less maintenance cost. Cedarapids Hammermills are available in 2033, 3033 and 4033 sizes—on skids or portable.

When you buy a crushing plant—buy the best—buy Cedarapids. See your nearest Cedarapids dealer for details.

THE IOWA LINE
of Material Handling Equipment Includes
ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS—STEEL BINS • BUCKET ELEVATORS • VIBRATOR AND REVOLVING SCREENS • STRAIGHT LINE ROCK AND GRAVEL PLANTS • FEEDERS—TRAPS • PORTABLE POWER CONVEYORS • PORTABLE STONE PLANTS • PORTABLE GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE ASPHALT PLANTS • TRAVELING (ROAD MIX) PLANTS • DRAG SCRAPER TANKS • WASHING PLANTS • TRACTOR-CRUSHER PLANTS • STEEL TRUCKS AND TRAILERS • KUBIT IMPACT BREAKERS

Cedarapids Built by IOWA

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

C. & E. M. Photo
Superintendent W. E. Orr and Resident Engineer Cecil B. Browning talk over the 3.3-mile U. S. 70 realignment job between Miami and Superior, Ariz.

New Highway Built Through Hard Rock

(Continued from preceding page)

sive ratio of 1⅛ to 1¼ pounds per cubic yard. Apache powder was developed by Arizona miners for the tough rock formations in that state, and Orr has used it successfully for many years. Delivery of powder to the job is good, and the loading qualities of bag powder are of course very desirable from the standpoint of speed. Orr has drilled some formations near Superior where ground water was found, but the rock on his present job is mostly dry.

Drilling and blasting with the churn drill is carried 5 feet below the grade line. There is a 28,000-cubic-yard overbreakage allowance in the contract.

Indians Run Jackhammers

A very important part of rock-removal work is a crew of Apache Indian drillers from a reservation near Globe.

"Many of them have followed our work for years, ever since 1930," young Bill Orr explained. "When we land a job they hear about it, in some mysterious way, and they turn up when you need them. Of course they make a lot more money now than they used to, so they'll work about three days and take out until their money is gone.

"But they're the best drillers I've ever seen. They're using 24-foot steel up there, with 2½-inch drill bits. Rock dust can blow in their eyes all day and they'll keep right on drilling. An Indian feels mighty bad at the end of 8 hours drilling if he hasn't put down 100 feet of hole. They seem to know when to feed a drill easy, when to burn in a hole, or when to push a drill hard. When a white man sticks a drill he laughs about it. An Indian feels uneasy. You can see him look around with a guilty expression."

Almost all the drillers are Apache Indians, though the Pimas, Papagos, Pumas, and Navajos still show up occasionally. Grandparents of some of these boys were the fierce western raiders of the roaring eighties, and for that matter some of the drillers now working on this great peacetime job can still accommodate a man who is looking for trouble!

All told, 15 Ingersoll-Rand JA55 Jackhamers are in use, and the compressor list includes a 500-cfm Gardner-Denver, a 310-cfm Le Roi, a 315-cfm Ingersoll-Rand, and a 105-cfm Worthington Blue Brute. Jackhammer holes are put down on 5 to 15-foot squares.

Timken steel and detachable rock bits are used. The detachable rock bits give about 6 inches to 2 feet of travel before they dull. Bits are sent in to the Allison Steel Co. at Phoenix to be sharpened, but churn-drill bits are dressed on the job. When the rock bits wear down to 1½ inches in diameter, which happens after they've been used five times, they are discarded.

Four Caterpillar D8 tractors with LeTourneau bulldozer and Angledozer blades work closely with the jackhammer crew, because much of the short-steel drill work is an aid to pioneering as well as a rock-removal scheme. Jackhammer crews frequently help take off a point so the blast-hole rig can be set up.

In this connection it should be pointed out that the Orrs are generally roughing in the entire job, before trying to finish any section, even though the quantities are well balanced. Working in that manner there will be very little if any material to rehandle, and roadbed once finished will be finally finished without further dressing.

Machines engaged in digging one odd cemented conglomerate pocket were pulled off and moved elsewhere until state technicians could sample it. The deposit was far too high in plasticity index to be suitable for selected base course. But in case it had been acceptable, Orr would have moved it only once—to its place on the roadbed—and that would have been good contracting.

The jackhammer crews are usually in the middle of all this pioneer work, laboring to get their machines set up and working. They use the same bag powder for the smaller holes, but up to five springings with 40 and 60 per cent Apache gelatin are given each hole.

Disposal of Material

Hauling equipment consists of four 12-yard White trucks, four 6-yard Hug

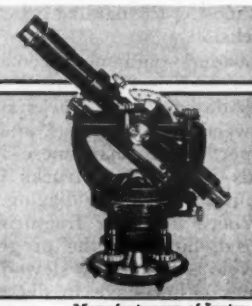
(Concluded on next page)

Order Now! MAKE SURE OF EARLY DELIVERY

UNIVERSAL LEVEL-TRANSIT

Latest, improved model. Telescope 12" long, 25 power — Horizontal Circle 4½" with vernier to 5 minutes — Vertical Arc 3".

Instant change-over from Level to Transit. Most practical all-around builders' instrument ever designed. Write for full details.



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Manufacturers of Instruments for Engineers, Surveyors and Builders.

MEMO to All Construction Supts:

Before we buy Buckets let's check Haiss Hi-Power Ratio 7:1

Among Buckets, Haiss Hi-Power excels through a time-tested combination of many superior features.

Weight distribution, for instance, is so concentrated that the bucket jaws carry downward to bury the entire bowl to insure the biggest possible payload.

Similarly, when the Haiss Hi-Power tackles a stuck-fast boulder it "grabs tight" to shake and tug until it's loose and "hoist away".

Investigate now the greater efficiency that comes naturally with buckets engineered by Haiss. Catalogs on request.

GEORGE HAISS MFG. CO., INC., Canal Place & E. 142nd Street, New York 51, N.Y.

Distributors in all large cities

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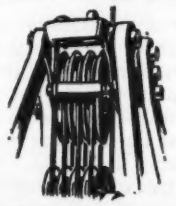
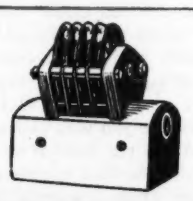


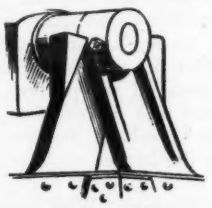
HIGHEST CLOSING RATIO (up to 7:1)

Can be reeved 3, 4, 5, 6 or 7:1 for speed or power as required. Exclusive 4-Position Wedge-Lock dead ending keeps reeving always parallel and 100% centered in sheave grooves.



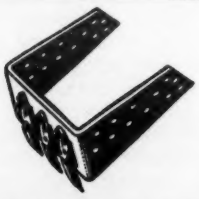
LOWER SHEAVES HIGH ABOVE COUNTERWEIGHT

Up, out of the muck. Non-pocketed. No place for dirt to jam, to cause friction or undue rope wear. Bolt holes in block provide for added counterweight.



CAST STEEL BLADE ARMS FOR STIFFNESS

Rib-reinforced. Rigid strength and extra long bearings (renewably bushed) keep bowl closing true. Full efficiency; bigger payloads.



HEAVIEST JAWS OF ANY BUCKET OF ITS KIND

Abrasion resistant alloy. Will stand heavy battering and still hold shape. Chisel-point or pick-point teeth of similar extra strength.

New Highway Built Through Hard Rock

(*Continued from preceding page*)

trucks, and a LeTourneau 14-yard Carryall behind a D8 Caterpillar tractor. The Carryall is used on those sections where it will remove the material, but most of the hauling is being done by trucks.

Loading equipment consists of two Bucyrus-Erie 43-B shovels, with 2-yard rock dippers. The trucks split equally between these two rigs, and the tough dipper with manganese-steel teeth loads the 12-yard trucks in about 3 minutes in ordinary digging.

Where improper fracturing has occurred, however, the progress of the shovels is materially slowed. The machines either have to dig around the oversize rock, or slide them aside where jackhammer men can re-drill and shoot them. If possible the big rocks are pushed to the bottom of fills by bulldozers.

One of the unusual aspects of fill on this job is the fact that many of the canyons are so steep that ramps to the bottom are simply out of the question. Loaded trucks back up to the edge, are stopped by a spotter for safety's sake, and dump their loads. When enough of a pile has accumulated in the bottom of the gorge, a bulldozer manages to inch down there and spread the material in horizontal layers. Broken stone is equipment-rolled for compaction.

One such fill, beginning at the bottom of a deep gorge, will rise 226 feet to grade! There is a deep cut just on the other side of the fill, and the elevation differential is enormous. There will be 128,000 cubic yards in that fill alone when it is finished.

Shovel and truck combinations are worked against a full face. The shovel runner of one of the 43-B's was trying, the day the job was visited, to keep one side of his rig hidden so visitors could not see what had happened recently.

"Yuh know, partner, I nursed that damn rig through fair jobs an' foul fer a real long spell," he explained. "Then t'other day I couldn't move her fur enough back for a blast because the fill ended, an'—well, they blowed half the damn cab off!"

The after-placing cross sections of fills, as well as many of the preliminary cross sections, are all very carefully taken by wye level due to the big yardages involved. Slope chaining and triangulation are frequently necessary. On some of the preliminary work the terrain was so bad the parties packed in on horseback, and went afoot where even the horses could not go.

It is truly a job to separate the men from the boys. With freezing near-zero winter temperatures at the 4,100-foot elevation on the job, every layout has its own fire for warmth. Lunches freeze unless they are kept close to the fire.

In the meantime the snow falls on the old road. And maintenance men have a hard time removing snow and sanding the curves with traffic also using the old 20-foot pavement. That day will soon pass. For one of the advantages in this new realignment not previously mentioned is the fact that it is going in at a much lower level than the road now in existence. Modern equipment is making it possible for men to blast a way through where they have only dreamed before.

Men like W. E. Orr, Sr., and Resident Engineer Cecil B. Browning often look at three small marks on the mountainsides. For they have known and loved this country for a long, long time. They see the age-old Pony Express trail where horsemen and buckboards once traveled. They note, higher up, the present highway that was built in 1921. And they see the third route, the one now under construction. "I wonder where and when Number 4 will appear," they say.

And the only answer is that the new road now building will accommodate much more than the 2,200 vehicle count per day now passing over this scenic route.

Personnel

Directed by E. B. LeFebvre, State Engineer for the Arizona Highway Department, the job is being supervised also by District Engineer R. J. Holland, whose headquarters are in Safford. C. B. Browning is the Resident Engineer.

In addition to W. E. Orr, Sr., and young Bill Orr, Paul Foster supervises grading and Russell Denison is the master mechanic.

Rubber Hose, Belting

A line of rubber goods for use in the construction field is made by Carlyle Rubber Co., Inc., 62-66 Park Place, New York 7, N. Y. Immediate delivery, guaranteed performance, long-life utility, and personalized service are claimed by the company for its products.

Belting is available for conveyors, portable conveyors, bucket elevators, and power transmission. Conveyor belting, where heavy material is handled and high tonnage is desired, is made in several styles for handling all types of abrasive materials, wet or dry. Power-transmission belting is made in flat or V-belt styles, for both heavy and regular duty.

Hose types include water hose for general and high-pressure service; suction hose, both rough-bore with the internal wire exposed for regular suction application, and smooth-bore with the internal wire rubber-covered for use with very abrasive materials; steam hose for live steam up to 340 degrees F; light-duty air hose for small compressors, chippers, riveters, light pneumatic tools, pumps, and general small-capacity air connections; heavy-duty air hose which is oil and heat-resistant for use with compressors in rock drilling, concrete breaking, scaling, and quarrying; welding hose for oxygen and acetylene; blow-gun air hose; and many others.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 8.

INTERNATIONAL
Diesel Crawlers

Your Best Bet

● Enough said when you say, "It's an International Diesel Crawler!"

Equipped with a bulldozer blade, it's your best bet for digging basements and other excavations.

With an International Diesel, whole blocks of basements can be dug in one operation—and economically. Then the same crawler can be used to spread the spoil and fill in between foundations or to push it over ramps into trucks for removal. And it can finish the job by building streets and landscaping the whole area.

No wonder many contractors who specialize in basement digging prefer the International Diesel Crawler.

Greatly favored for this work is the International TD-14 because its size is within limits which permit ready transportation on the streets and highways of most municipalities and states.

Yet it is a powerful, fast working crawler, fit for your toughest assignments . . . *a dependable, economical earth-moving tractor.*

Ask the International Industrial Power Distributor near you to supply specifications and complete information about this and other International Crawlers, Wheel Tractors, Power Units and matched equipment.

Industrial Power Division

INTERNATIONAL HARVESTER COMPANY
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CRAWLER TRACTORS
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DIESEL ENGINES
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INTERNATIONAL

Admixture Increases High-Early Strength

An admixture designed to give standard portland cements the qualities of high-early-strength cements and waterproof cements is made by Super Concrete Emulsions, Ltd., of 1372-78 E. 15th St., Los Angeles, Calif. It is an emulsion of chemicals and specially prepared oils, and is of a heavy consistency.

Some of the properties claimed for concrete containing this product, which is known as Suconem, are high-early strength, watertightness and weather resistance, greater density, quick stripping and plasticity, workability, and the reduction of segregation, laitance, and efflorescence.

Suconem is made in two grades, Yellow or Red Label. The Yellow is used when the high-early strength or watertightness of the Red Label are not the principal qualities desired.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

New Electrodes

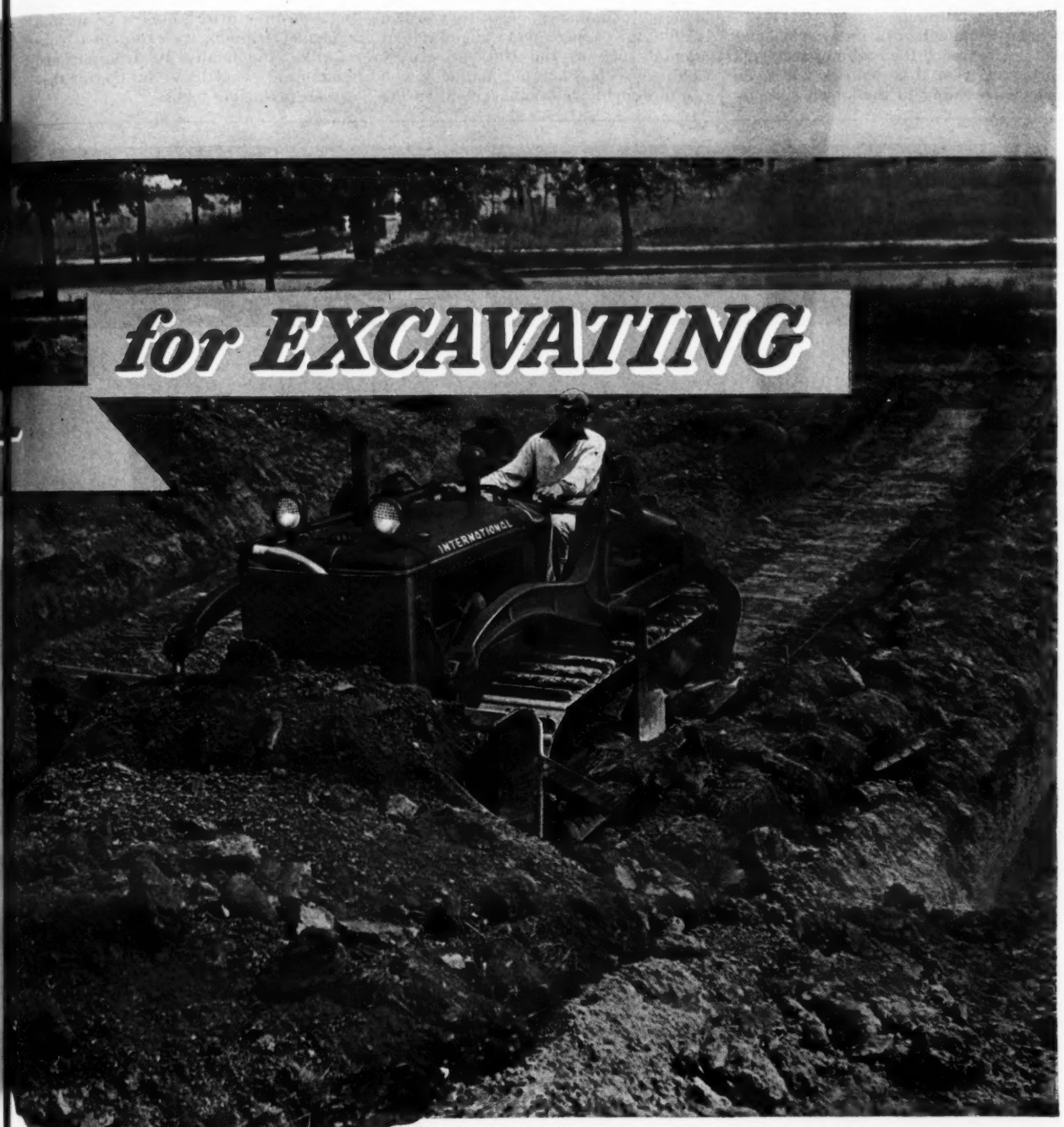
A new member of the automatic arc welding electrode family has been announced by the Wilson Welder & Metals Co., Inc., 60 E. 42 St., New York 17, N.Y. The firm enters this field with the addition of Una automatic wires and Una tapes to its line of manual electrodes. Five knurled-type wires and five flux-impregnated tapes comprise the present line.

Designed for flat-position operation, their applications vary, ranging from thin-gage sheet-metal forms to axle housings, boilers, torque tubes, etc. They are being made in several diameters and alloy analyses, and may be used separately or in conjunction with the tapes.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 10.

Mixermobile Moves Offices

The opening of new offices has been announced by Mixermobile Co., Inc., effective in January of this year. The new offices are located at 245½ So. Western Ave., Los Angeles 4, Calif.


for EXCAVATING
INTERNATIONAL
You can see for yourself in these photographs how the International TD-14 with a bulldozer blade gets on with a basement digging job. Here the average distance from cut to spoil was 60 feet, depth to dig was 6 feet, yardage dug was 420 cubic yards of clay. Total time required was 6½ hours.
INTERNATIONAL HARVESTER
Industrial Power

Training Can Help To Achieve Safety

Training Workers, Foremen, And Management Includes Telling, Showing, Testing, Checking Safe Practices

✦ "TRAINING Will Help!" That was a modest slogan of the wartime Training Within Industry program. It applies today and any day. A paraphrase could be: "Training Will Help Achieve Safety". John F. Sembower stressed this slogan in his remarks on "Employee Training vs. Construction Accidents", delivered before the Construction Section of the National Safety Congress held in Chicago last October. Mr. Sembower is former Training and Relations Supervisor of the Hanford Engineer Works.

Well trained workers expedited construction during the war, he recalled. Now, as post-war construction swings into high gear, well trained workers will expedite that construction also. And, Mr. Sembower pointed out, "well trained workers will expedite *safety!*"

Status of Safety Training

Safety men know a great deal about training, he said. The inventor of "Tell, Show, Test, Check" was a safety man. There is no better blueprint for training.

Whatever our preconceived notions, or even our prejudices about training, training *always* is going on. In the construction industry it has long since lost everything but an historical connection with the classroom. It has moved out to the job. We recognize training in the brief consultation between the foreman and the workman before a simple task is undertaken, as well as in the more formal programs.

No longer is there any question whether to have training or not to have training. The issue is between *good* training and *bad* training, and how the great untapped resources of effective training may be harnessed for safety.

Although all of us have much to do with training, we do not often enough sit down to study how we may use it more effectively, Mr. Sembower said.

Analyses of Specific Cases

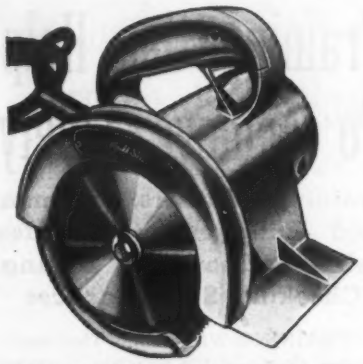
He reminded his listeners of the Construction Section meeting where they saw three graphic presentations of typical accident investigations. These were conducted by Joseph A. DeLuca and a group acting as construction job personnel. There is no better way, he said, to appraise the value of training as a tool of safety than to consider it in connection with each of the situations.

First was re-enacted an investigation of the failure of a swing-stage scaffold. The distraught foreman complained, "I told him and told him to fasten his safety belt".

In the old T.W.I. manual for Job Instructor Training there was also a foreman who reported bitterly: "I tell him and I tell him, but still he don't do it!" Of course, said Mr. Sembower, anyone presumably can fasten a safety belt if he really wants to. But even in that simple situation a training angle arises. And the need for showing, testing, and checking, as well as talking, becomes manifest.

The second investigation was of the failure of a concrete slab under construction. In the opinion of "Joe, the U. S. Government Engineer", the supports failed because "they were not properly installed when two principals in supervision did not collaborate sensibly—either because of lack of mutual regard, absence of a defined line of authority, or just plain lack of coopera-

(*Concluded on next page, Col. 2*)



The new Mall electric-powered saw has a 6-inch blade and cuts up to 2 inches.

New Power Hand Saw

A portable hand saw weighing 8¾ pounds is now coming off the production lines of Mall Tool Co., 7730 So. Chicago Ave., Chicago 19, Ill. Known as the Model 60 Mallsaw, it has a 6-inch blade and a cutting capacity up to 2 inches. It runs on 115-volt ac and dc with other voltages available upon request. The blade revolves at 3,000 rpm.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 12.

Koppers Staff Promotions

Three staff members of the Wood Preserving Division of Koppers Co., Inc., have been advanced. J. M. Irvine, formerly District Sales Manager in New York, has been appointed Assistant to the Vice President in charge of commercial sales. R. H. Bescher has been named Manager of the Technical Department. Walter P. Arnold, formerly Manager of the Technical Department of this Division, has been appointed Assistant to the Vice President in charge of railroad sales.

Mr. Arnold and Mr. Irvine will be located in the headquarters of the Wood Preserving Division in the Koppers Bldg., Pittsburgh, Pa. Mr. Bescher will continue to have his headquarters in the Wood Preserving Division Technical Laboratory which is located at Orrville, Ohio.

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Training and Safety

(*Continued from preceding page*)

tion".

These problems, too, are well within the bailiwick of training. Principles of organization and good supervision are integral parts of such programs as foreman training and top-supervisory training. Indeed, training seems to be about the only weapon which can be brought to bear on such situations. This is the very front line of the battle of employee training vs. construction accidents.

The third sketch covered an investigation of the failure of a crane boom on steel erection. There were technical safety points involved, but a major factor seemed to have been the operator's preoccupation with a personal-relations problem at home. This is also a job-relations problem, and the answer to it is **foreman training.**

Safety men will grow many grey hairs as they approach the realm of accidents springing from these causes which do not yield readily to their own specialized methods of attack. For that reason the field of training looms as a savior to them.

Aspects of the Safety Problem

Mr. Sembower said he would not presume to partition the field of safety into its various divisions. Not all safety men agree upon any one set of component parts. Yet he would suggest three large aspects: the *technical*, the *emotional*, and that portion of the total safety problem which yields best to *rationality* on the part of the workman.

To explain: after you have applied the science of safety and developed the know-how, you are *technically* ready to vanquish accidents. The next step is to secure the will, the *emotional* desire to work safely. Effective promotional techniques do that job exceedingly well.

But there remains the *rational* phase of safety compliance. That is, you can hand the management an excellent manual such as the National Safety Council's "Pre-Planning Manual"; you can thoroughly sell management on the need for safety. And still there will be a gap. Into it, training fits.

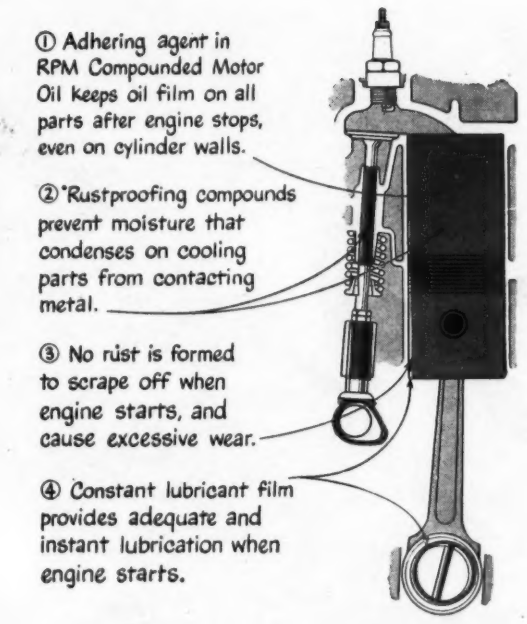
The same applies to the workman, said Mr. Sembower. You give him his little craft handbook and you keep before him the eye-catching posters and slogans. He has in his pocket the rules for safety which have been synthesized from safety's technical analysis. And in his heart he has an abiding faith in safety, a real desire to work safely. But still he may not be a safe worker.

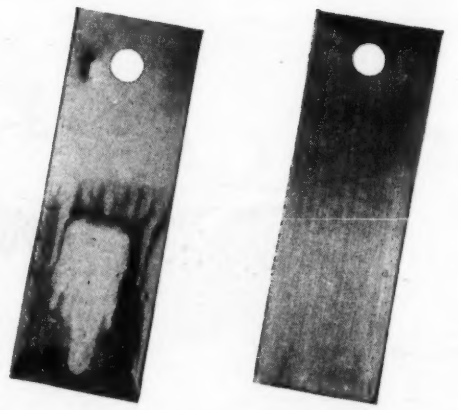
The only hope for bridging that gap is training—telling, then showing, then testing and retesting, checking and rechecking.

. So draw up a training plan and stick to it through thick and thin, said Mr. Sembower. Begin it at once with the best you have in training talent and material. Make it practical, effective, and quick. Tailor it to fit special situations as they arise. Follow it up with refresher training, re-evaluate it constantly. And finally, relate safety and training in everything you do, for they are an invincible team.

STANDARD ENGINEERS NOTEBOOK

CALOL RPM


① Adhering agent in RPM Compounded Motor Oil keeps oil film on all parts after engine stops, even on cylinder walls.
② Rustproofing compounds prevent moisture that condenses on cooling parts from contacting metal.
③ No rust is formed to scrape off when engine starts, and cause excessive wear.
④ Constant lubricant film provides adequate and instant lubrication when engine starts.



This actual photograph shows how one HIGH-QUALITY MOTOR OIL "peeled" off almost all of this test strip of steel when it was placed in corrosive-moisture conditions similar to those in a cooling engine. The oil concentrated at one spot and the unprotected surface quickly rusted.

RPM COMPOUNDED MOTOR OIL kept this strip bright and shiny, completely sealed against rusting, when it was exposed to the same conditions. "RPM" compounds keep a constant rust-proofing lubricant film on engine parts at all times, whether they are idle or moving.

How RPM Motor Oil Rust-Proofs As It Lubricates

Rusting, caused by corrosive moisture, is the greatest source of wear in automotive engines (85%, according to some engineers). It can be controlled by using RPM Compounded Motor Oil.

Additional compounding for "RPM," perfected by Standard of California scientists, provides a rust-proofing lubricant film on internal engine surfaces. The heaviest moisture condensation in idle or cold-running engines will not cut through it.

Other compounds in RPM Motor Oil give it adherent qualities so the film stays on parts at all times. They also loosen and remove gum and lacquer, lubricate hot spots, resist sludge formation, bearing corrosion and stop foaming.

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For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Colo.; Standard Oil Company of Texas, El Paso, Texas.

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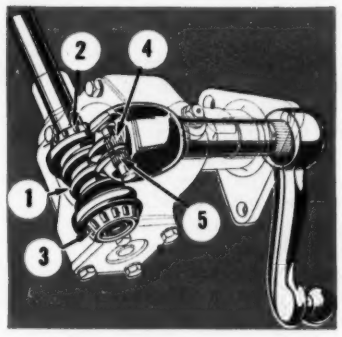
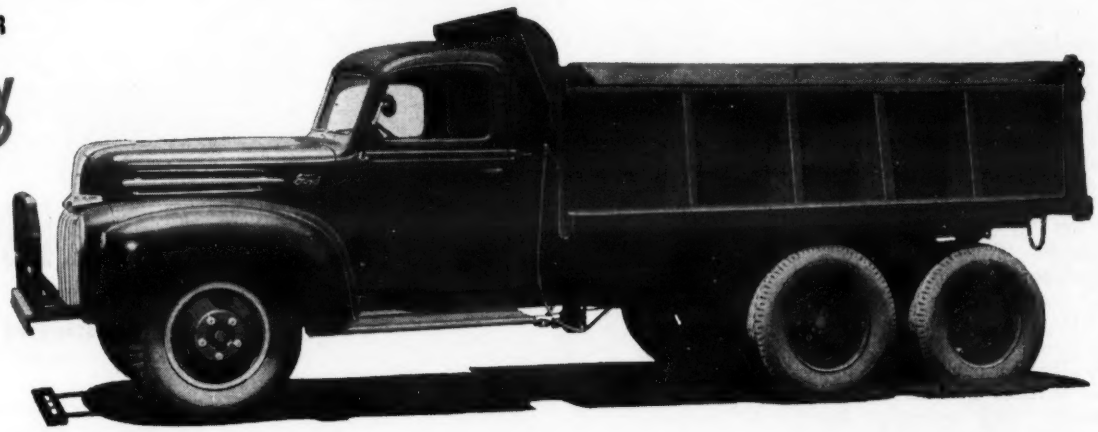
ONE big reason—
FORD STEERING STANDS UP!

Ford worm-and-roller steering gear reduces *rubbing* friction to a minimum. *Rolling contact* is employed to reduce friction at five vital points. This spares muscle and saves wear. The worm gear (1) is straddle-mounted on two large, opposed, tapered roller bearings (2 and 3). The worm acts upon an easy-turning roller instead of a common sliding cam or split-nut, and this roller is mounted on two needle-type roller bearings (4 and 5). Bearings of both the worm and the sector shafts may be adjusted, thus promoting long life and proper action with less replacing of parts.



Ford

THE 6 YOUR PICK OF POWER THE V-8



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That's why FORD TRUCKS LAST LONGER . . . why, as the national truck count for 1946 just released shows, *more than half of all Ford Trucks in use are at least 9 years old* . . . why there are more Ford Trucks in service now than ever before in history. Over 100 body-chassis models to pick from. Ask your Ford Dealer.

MORE FORD TRUCKS IN USE TODAY THAN ANY OTHER MAKE

Portrait in Print

By BILL QUIRK

Thomas Crimmins Foresees Years Of Work Ahead for Contractors

✦ THOMAS Crimmins, third-generation member of the New York contracting firm which bears his name, predicts bigger, busier, and better years ahead for contractors in heavy construction. And in becoming qualified to make such a prediction, he did more than place his ear to the ground. He spent practically his working life underground. For he specializes in foundations, tunnels, excavation, public utility substructures, and waterfront work.

The Crimmins family has been burrowing and boring beneath the surface of New York City for well nigh onto a century. But this dean of the big town's contractors feels that the diggings and probings will be continued as long as Bagdad-on-the-Subway remains a metropolis. Crimmins' contribution to the development of his native city received public recognition in February. At that time he was awarded a citation and bronze plaque by The Moles, New York society of tunnel and heavy-construction men of which he is a member, for "outstanding construction achievement".

Now 66, this big, genial, cultured President of the Thomas Crimmins Contracting Co. has been following in the footsteps of his Crimmins ancestors, whose history has been inseparably woven with the growth of New York. In his spacious, modern office on Madison Avenue, near the busy intersection of 59th Street, he relaxed a bit as he recalled how his company got its start.

"My grandfather, also a Thomas Crimmins, came to this country from Limerick, Ireland, in the spring of 1837, over a hundred years ago. He was then 25, and he went to work at the country place of Thomas A. Emmet, Jr., nephew of Robert Emmet, famed Irish patriot. Located just a short distance from here, near where the old Boston Post Road crossed 59th Street, the estate was noted for its botanical gardens. But the city was growing. And as the population moved uptown, these estates and farms of what was then known as Mount Vernon had to go. In 1848 they were sold and the present system of streets was laid out over this area."

Warming up to his subject, the broad-shouldered grey-haired constructor paced about the room. Around the walls of his office are many old prints and lithographs depicting early construction scenes in which the name of Crimmins played a part. As he described a few of these jobs, his chiseled features became more animated, his blue eyes twinkled behind their glasses, and reminiscing smiles flitted across his ruddy face.

His 181 pounds are well proportioned over a 5 foot 10½-inch body, and U. S. Army service both on the Mexican border and in World War I has left its impress in an erect military bearing. He went all the way from private in the National Guard to commander of the 102nd Engineers, 27th Division, with the rank of colonel. And he received a citation for meritorious service during his nearly two years of campaigning overseas in the first World War.

Contracting Start

Pausing before a picture of his namesake and grandfather, the contractor continued. "When that New York eastside farm land was cut up, it presented an opportunity for my grandfather to enter the contracting business. He helped subdivide the estates he knew so well, he laid out streets, installed sewers, dug foundations, and performed sundry other jobs required in an expanding city."

The beginning was small, but there was plenty of work to be done and the pioneer Irishman prospered. In 1854 he built for his family a fine brick home, in what was then far uptown, at the southeast corner of Second Avenue and 60th Street. It was the first of its type to be erected north of 40th Street. Then came the Civil War and the resultant lump in civil-engineering construction. n 1864 the contractor was compelled to take his eldest son John D. out of St. Francis Xavier college when he was sixteen years of age. But the two

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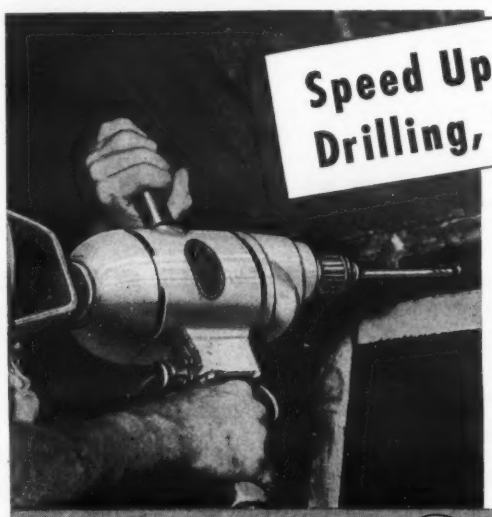

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There's entirely new operating ease and working comfort available for the new SCOOPMOBILE. Rough terrain . . . tight spots . . . big loads . . . high loading . . . they're all in a day's work for the new, improved SCOOPMOBILE.

Contractors are finding what used to take *days*, now takes only *hours*. Labor bills are less . . . jobs are completed quicker. One man and a SCOOPMOBILE can load up to 80 yards per hour. Lifting capacity 4000 pounds. Quick change attachments include bucket, concrete hopper, fertilizer forks, lumber forks and crane boom.

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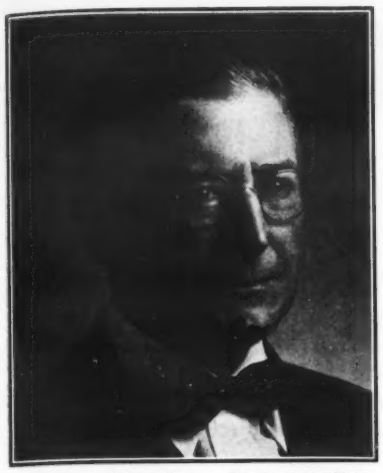

Thomas Crimmins, third-generation member and President of the Thomas Crimmins Contracting Co., New York, was recently honored by The Moles for "outstanding construction achievement".

Crimmins Sees Much Construction Ahead

(*Continued from preceding page*)

formed a partnership under the name Thomas Crimmins & Son. When the war was over the city had a building shortage on its hands which gave the father-and-son combination full opportunity to add another phase of construction to its activities.

Son John was an able assistant and soon was recognized as a specialist in the then-as-always metaphysical art of bidding. The young firm also expanded to become a large operator in real estate. And in this field John D. Crimmins acquired such a reputation as a keen judge of property values that he was asked to serve as a commissioner in the adjustment of estates under litigation. Keeping pace with new methods in the contracting business, the Crimmins team was quick to use mechanical equipment such as the steam shovel and other appliances on its excavation and foundation jobs.

By 1871 Thomas Crimmins, the founder, was ready to retire. But he retained a keen interest in the work he started until his death thirty years later at the age of 89. Upon retirement, his place was taken by another son, and the firm then became known as John D. and T. E. Crimmins. In 1894 John D. left contracting to become President of the Street Railway System in New York City. But in 1900 his son Thomas, the present President of the company, fresh from Harvard with a civil-engineering degree, entered the business.

Uncle and nephew operated under the name T. E. and Thomas Crimmins until 1904. Then T. E. retired and the business was incorporated as Thomas Crimmins Contracting Co. with 24-year-old Thomas as President; R. R. Costello, Treasurer; and E. J. Shafer, Secretary. F. N. Benedict joined the company as Vice President and Chief Engineer in 1909.

Early Impressions

"Even as a boy I was attracted to the contracting business," the Colonel recalled. "I was born on East 68th Street only a short distance from our shop and yard. Ours was a big family. I had six sisters and five brothers, and the boys were all larger than I. But the others did not seem to gravitate towards the work as I did. I would hang around the old blacksmith shop and forge by the hour. We made our own dump wagons in those days and the place was always busy. We had over 200 head of horses quartered in adjacent stables. Horses were a very important item in a contractor's equipment then—machine shops hadn't yet superseded the old forges, and the horse hadn't yet been replaced by truck and tractor."

The contractor waxed nostalgic for a moment over the horse-and-wagon days on Manhattan's East Side. "We have operated from this same neighborhood ever since my grandfather started in business," he continued. "I live only a half mile away on East 72nd Street, but we had to move our shop and yard across the East River to Long Island City when this neighborhood could no longer be considered uptown.

"But to get back to the company. I remember very clearly my first job back in 1900 laying gas mains 36 and 48 inches in diameter. We also had a hand in the early construction of the city street railway system, both in Manhattan and the Bronx. This work was so extensive I covered it on horseback."

Underground Work

Under its new president, the company continued the course begun in 1865, specializing in underground construction in New York's metropolitan district. As the company and city both grew, Thomas Crimmins likewise kept pace and is now considered one of the leading experts on underground New York.

A few of the below-surface contracts completed by Crimmins are the foundations for the piers of the Henry Hudson Bridge, Hell Gate and the 14th Street power stations for Consolidated Edison Co., Bowery Savings Bank, Equitable Building, Graybar Building, Farmers Loan & Trust Co., 39 Broadway, First National Bank, Lord & Taylor, R. H. Macy & Co., Metropolitan Life, Paramount, Pershing Square, Ritz-Carlton Hotel, Waldorf-Astoria Hotel, Savoy-Plaza Hotel addition, Rockefeller Institute, Federal Reserve Bank Building addition, together with numerous track and third-rail contracts

(*Continued on next page*)

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Seeds, Rakes and Rolls in One Operation.

It will sow grass seed, commercial fertilizer, limestone or any granular material that can be broadcast on the surface of the ground and raked in.

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UNIT 514
½-Yard Dragline

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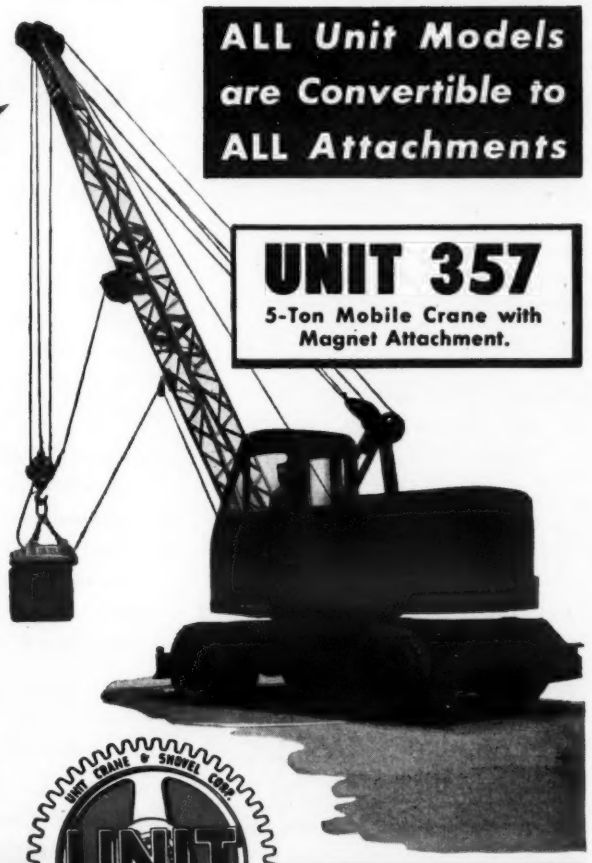
ALL Unit Models are Convertible to ALL Attachments

UNIT 357
5-Ton Mobile Crane with Magnet Attachment.



Here are three time-tested UNIT machines that continue to "make the headlines" because of their unusual speed, efficiency and all-around dependability. Check the following exclusive UNIT features: *Compact, streamlined design . . . Straight line engine mounting . . . Drop forged alloy steel gears . . . Automatic traction brakes . . . Interchangeable disc type clutches . . . One-piece cast gear case* . . . and above all, UNIT's safety-promoting *FULL VISION CAB*. No other excavator on the market has all these features.

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WISCONSIN, U.S.A.

Crimmins Sees Much Construction Ahead

(*Continued from preceding page*)

in the subways. Most of these jobs and others of similar nature have been in the deep rock characteristic of Manhattan Island.

Only in a few instances has the company left New York on jobs. During the 1907 panic, Crimmins had 1,200 men working on the construction of an electric trolley line when the project folded and the streetcar corporation went into receivership. Crimmins then contracted to enlarge a section of the Erie Canal near Medina, N. Y., which took two years to complete. On this waterway construction the contractor used for the first time the big Lidgerwood Crawford steam-powered draglines with 80-foot booms and 2½-yard buckets.

By the time that work was completed, the short-lived depression had disappeared. The city entered upon a period of deep foundation excavation for its many tall and massive skyscrapers which were then just beginning to be erected. This period is still very much with us, and the Thomas Crimmins Contracting Co. has just completed the foundation for the new Esso building between 51st and 52nd Streets. It is now starting a deep foundation for the Metropolitan Life Insurance Co. at 25th Street and Madison Avenue, similar to one adjoining this site which it completed some time ago.

"Some of those deep foundations are the most difficult and yet the most interesting of any contracts we have undertaken," the Colonel said. "When you dig 75 feet below street level with about 40 feet of that through rock, and tidewater only 6 feet below street level, it is ticklish going. Yet the trend is towards deeper foundations, with more cellar space in demand.

"Owners want underground car-parking facilities with turntables and ramps or elevators. And it is natural to develop these features below street level. You can use 100 per cent of the area of your lot in underground construction; but in building above the surface, zoning laws and set-back requirements put restrictions on the full use of the lot limits. Where land values are high, it is sound economics for the builder to go deep and avail himself of as much space as he can, for that area is the cheapest he can find.

"Once we could build cellars only as deep as the sewers that flowed beneath the street. Then we would flip open a manhole, measure the distance to the sewer invert, and dig a foundation only to that level. The modern ejector pump has changed that picture and permits our prevalent deep excavations."

Gets Things Finished

The Thomas Crimmins Contracting Co. enjoys a perfect record of finishing every job it has started. But what is even more interesting in these troubled times of labor-management relations, it has never experienced a strike or stoppage. The best explanation of this happy condition lies in the deep understanding of human nature with which Thomas Crimmins is endowed. He has built up a strong nucleus of loyal employees who have served the company for many years and for whom he has a deep and sincere affection. They in turn appreciate fair treatment and know that if they have any grievances a fair hearing will be forthcoming.

Crimmins helped organize the Contractors Protective Association designed to safeguard owners and the public against unscrupulous contractors. This association was awarded one of the early charters back in 1910, and it has been a strong factor in negotiating wage agreements with workers in the construction industry. He also served as President of the General Contractors Association of New York in 1916.

During the recent war years, the company constructed an aluminum plant at Maspeth, Queens, in the suburbs of New York. In the past, contracts were taken from either public or private agencies: for example, the construction of a section of the Catskill Aqueduct for the New York City water supply; or the building of an underground loop track beneath the Grand Central Station when the Waldorf-Astoria Hotel was being erected on Park Avenue. (The latter job for the New York Central Railroad was probably the toughest the company ever undertook.) But now practically all the company's work is done on a fee basis for private agencies, with Thomas Crimmins usually signing the contract after the job is started. To reach that pinnacle a contractor must first build a reputation, and Crimmins

(*Concluded on next page*)

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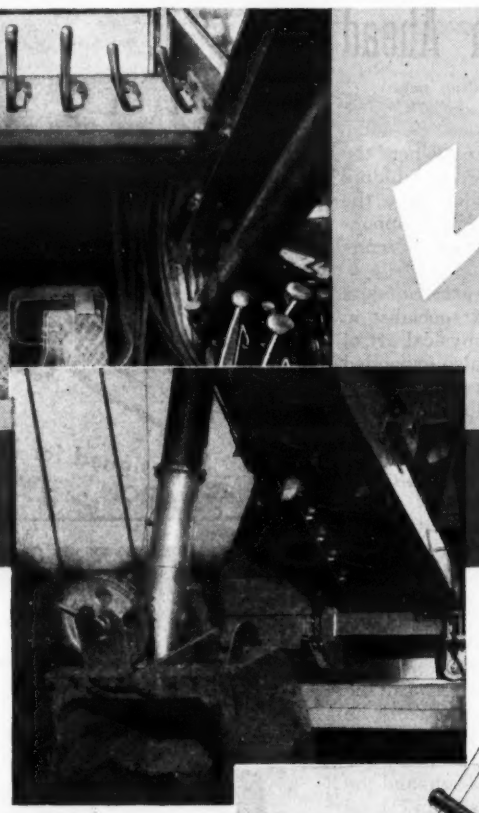

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Speed . . . more yards-per-day, is yours with a Buckeye Shovel. Ask users what they like about the Buckeye . . . and repeatedly you'll hear that Buckeyes are fast and very easy to operate. The reason . . . an exclusive Buckeye feature which controls all shovel action . . . is Vacuum Power Control. Instant response is yours to the few, centralized operating levers. Results in less operator fatigue . . . Vacuum Power works with, not against the operator. More than that, this modern shovel control gives you full "feel." Control is smooth. Swing, crowd, hoist and travel are exactly synchronized. For the complete Buckeye Shovel story write for the new Buckeye Catalog 846.

BUCKEYE TRACTION DITCHER
Division of Gar Wood Industries, Inc.
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BUCKEYE SHOVELS ARE CONVERTIBLE INTO ANY TYPE OF DIGGING UNIT REQUIRED . . . TRENCH HOE, DRAGLINE, OR CLAM SHELL

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CONVERTIBLE SHOVELS · ROAD WIDENERS · TRENCHERS · SPREADERS · FINEGRADERS

Crimmins Sees Much Construction Ahead

(Continued from preceding page)

has accomplished that objective with plenty to spare.

Besides his contracting interests Colonel Crimmins is active in a realty operating company and is a director of several hospitals and corporations. He was instrumental in helping to found the Harvard Engineering Society and is a past president of the Wee Burn Golf Club at Darien, Conn., where he has a summer home.

Fourth Generation

He and his wife have two daughters, a son, and two grandchildren. The son Robert, now 30, is a strapping 6-foot 4-inch husky. After graduating from Harvard, he took another degree at Columbia, this time in engineering. Five years in the Army, where he became a captain of engineers, delayed his entrance into the contracting business. But he is now at the work of underground construction in the best Crimmins tradition. There he is joined by a cousin, A. Holmes Crimmins, 38, of similar height, who is now Treasurer of the company and served with the Corps of Engineers in the 1060th Port Construction and Repair Group.

Colonel Tom Crimmins is turning as much of the firm's work as possible over to his son and nephew so that this fourth generation can continue in the work that was started by another Crimmins nearly a century ago. Although the Thomas Crimmins Contracting Co. is ever on the alert for new and modern methods of conducting its business, it has not severed its ties with the past.

The old prints on the walls of Thomas Crimmins' private office, the grandfather's clock in the corner, the complete set in the bookcase of Valentine's "Manuals" dating from 1841 (which describe in great detail the early growth of New York City), all testify that this big, hustling, modern organization is far from being the first to lay the old aside. Tradition is maintained. And from one side of the room the sculptured stone bust of the first Thomas Crimmins, carved in 1898 when he was 86 years old, looks on in approval.

Blade Edges Renewed

A steel bar which is suitable for salvaging bulldozer, drag, or maintainer blades, was recently put on the market by Allied Steel Products, Inc., 7835 Broadway, Cleveland 5, Ohio. This work-hardening steel edge is said to prolong the life of a blade many months and to effect considerable savings in blade-replacement costs.

The Re-Nu Edge bar can be welded to the square or worn edge of the blade with an all-purpose high-grade steel electrode. In order to protect the weld, it is then covered with a thin layer of hard-surfacing electrode. The same material is also used around the ends or corner castings where the most severe wear takes place.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 14.

Motor-Repair Equipment

In the light of current scarcities, the maintenance and repair of motors and generators remains highly important. As an aid to conserving your present equipment, Holub Industries, Inc., Sycamore, Ill., has released a 10-page illustrated catalog describing its motor-maintenance tools.

The equipment described includes: commutator and slip-ring resurfacing stones, polishing stones, commutator saws and milling cutters, carbon brush seaters, blowers and vacuum cleaners for removing dust and lint from motor windings, a varnish insulation sprayer, voltage and circuit testers, 14 types of wire-insulation strippers, live centers for lathe turning of armatures, fuse reducers, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 62.

Versatile Dozer

An attachment that can be used as either a bulldozer or angle grader when installed on a Farmall Model H or M tractor, has been announced by the Acme Wire & Iron Works, 1343 W. Laurel St., San Antonio 6, Texas.

Said to be easily installed, the Acme unit consists of a bulldozer, two moldboard extensions, hydraulic cylinders, and rubber hose. The use of one extension converts the bulldozer to an angle grader, while both extensions make it into a snow plow.

Hydraulic controls lift the blade. An adjustable shoe gage on each end of the blade keeps the operator from digging too deep.

To convert to the angle grader, you pull three pins in one push beam, according to the direction of the angle desired, and attach the moldboard extension to the rear end of the blade. Used in this position, the Acme serves as a small grader for building roads, terracing, leveling high spots, etc. The same method is followed in adding the extra extension to the forward edge of the blade to convert it to a snow plow.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 15.

Dealer Adds Field Agent

The addition to its staff of H. F. Jorgensen as representative has been announced by The John N. Thorp Co. of New York City. The Thorp organization is a distributor for Mall Tool Co., Marvel Equipment Manufacturers Corp., Jaeger Machine Co., Rust-Oleum Corp., and Woolery Machine Co.

IN 1844, three years before Alexander Graham Bell was born, and long before the first Prairie-Schooner crossed the Mississippi River, John August Roebling's confidence in the suspension principle of construction so impressed the engineers of the State of Pennsylvania, that they authorized him to build the world's first suspension aqueduct.

How much is his confidence worth to all the thousands of engineers who followed and to humanity in general that have benefited from his pioneering venture?

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Here at Roebling, we believe the finest steel used in the manufacture of wire rope is "Blue Center." It was developed and is produced in our own open-hearth furnaces. From this steel alone we make our "Blue Center" Steel Wire Rope . . . in a complete range of sizes and constructions . . . in preformed or non-preformed types. This variety is so wide that you can find the *right* rope for your particular need.

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Your Roebling Field Engineer can be of help to you in choosing this *right* rope. Thoroughly grounded in wire rope and all types of rope-operated equipment, he'll see that you get the greatest returns from your wire rope investment. Help yourself to his specialized knowledge . . . call him at our nearest branch office.

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A CENTURY OF CONFIDENCE

County Cuts Its Debt; Keeps Road Budget Up

Slices $283,000 From Its Bonded Debt, but Maintains Roads to Peak Standards; How It Is Done

✦ IN this day of shortages, it seems unusual to come across a county whose three commissioners have managed to purchase some new road-building equipment. And in this day of excessive public debt, they have also chopped the bonded indebtedness of their constituents from $410,000 to $127,000, all in four short years. That record can be checked at Fort Scott, seat of Bourbon County in the southeastern part of Kansas.

The two new Caterpillar No. 12 motor graders and the one American No. 8 motor grader, which this heads-up organization managed to get by placing its order immediately after V-J Day, are now patrolling the hilly roads in the western part of the 675-square-mile county. A new Caterpillar D7 tractor with a Caterpillar bulldozer blade is doing heavy grading all over the county. It began this past winter to remove miles of hedge, long a source of annoyance to road builders and a cause of lost crops to the farmers on whose land it grows.

A reasonably new International mower, mounted on an International rubber-tired tractor, did continuous duty last summer on roadside shoulders. Two front loaders—one Hough mounted on an International wheel-type tractor, and one Lull mounted on a Minneapolis-Moline wheel-type tractor—are used to load trucks with road-building material.

The Board of Commissioners, in cooperation with County Engineer G. C. Thompson, has accomplished these results by constant effort, repeated orders for equipment, and a centralization of authority at the county seat. The public debt has been reduced in a realistic manner by paying off the bonds, as they matured, through taxation. If a few people have protested about this taking the bull by the horns, there are just as many others who are thankful.

County Road System

Bourbon County has 175 miles of secondary roads allotted as a part of the new PRA-state highway participating program. Some 11½ miles are now in the planning and survey stage, and the commissioners hoped that some of this new construction could be started by contract before the end of 1946. This extensive system of secondary roads will add to the county's already impressive network of 1,200 miles, more than half of which is all-weather surfaced.

Back in the 1920's, the Kansas State Highway Commission built about 32 miles of macadam pavement through Bourbon County. This was later abandoned in favor of new state highways with better alignment. The old sections of black-top were turned over to the County as a "gift", and have been a maintenance problem ever since. About 400 miles of county road has been surfaced with crushed rock or stream-bed gravel, graded and drained. Down in the southeastern part of the county they have built 25 miles of improved road by using slate from the big strip coal-field mines. Only 180 miles is classed as unimproved. The rest is graded and drained.

County roads in the northwest section traverse steep hilly country which borders the Osage River watershed. The new motor graders were put in this district, where they can cope with rocks and hard ditch pulling. Not all of Kansas is flat.

Administration and Finances

Bourbon County is divided into eight road-building and maintenance districts, each district having a maintenance crew and equipment assigned by the County Engineer. The Board of Commissioners is composed of Floyd E. Ramsey, Chairman; George Hare, Vice Chairman; and Ralph Singmaster. Their offices are elective, and the office of county engineer is appointive.

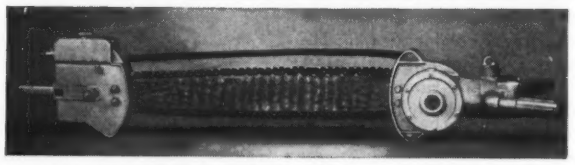
Floyd Ramsey is the Commissioner of the western district. His territory is at least as large as the two other commissioners' combined. In Bourbon County the function of a commissioner, so far as road maintenance is concerned, is to bear the curses and complaints of all the people who have had pet ideas about roads for years. Seriously, however, all suggestions and complaints are correlated by the three men with a county-wide attitude in mind, and road building is a county rather than purely a local problem.

The division of road-building money among districts is not equal in dollars. It is regarded as a county fund, and appropriated on the basis of mileage and tough conditions of maintenance.

Funds for maintenance of the county

(*Continued on next page*)

Investigate this modern power tool



For clearing and cutting timbers, and topping piles with speed and accuracy, this modern power tool is just what you need—especially designed to meet post-war construction requirements. Pneumatic model illustrated weighs only 46 lbs. Gas and electric models also. Local demonstrations available in most areas.

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CIT COOPERATES fully with both buyer and seller. When you order equipment, tell us what you are buying, the balance to be financed, how you want to pay for it. As quickly as you obtain delivery, a C.I.T. check completes the purchase.

CIT EXPERIENCED staff will gladly handle all financing details for you in a manner exemplifying of "The Mark of Leadership." Get in touch with any office listed below for rates, terms and full information.

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AFFILIATED WITH COMMERCIAL INVESTMENT TRUST INCORPORATED

County Cuts Its Debt; Keeps Road Budget Up

(*Continued from preceding page*)

highway system come from a share of the 3-cent gasoline tax and vehicle registration collected by the State of Kansas. These funds are turned back to Bourbon County every quarter at an average rate of $7,000. A road-tax levy of $2.674 per $1,000 of assessed real-property valuation finances the remainder of an estimated $130,000 annual budget for the upkeep of roads and bridges.

A special levy of $0.918 per $1,000 has also been set up to raise funds for post-war construction, as the County will participate in the new secondary-roads program. The State collects its part of this money under authority of a law enacted two years ago. The law allows the State to collect a tax of 1 cent per gallon on all gasoline, regardless of where it is used. However, the passage of that law was extremely close in the State Legislature, and it is possible that certain exemptions may be made at the next meeting. Airplane owners, for instance, do not see eye to eye on this matter of financing secondary highways with taxes on airplane gasoline.

All matters relating to maintenance and construction of roads rest with the Board of Commissioners and Engineer Thompson. The traveling maintenance crews receive their orders from Thompson, who crosses the county by automobile each week. And every commissioner, of course, is in close touch with his district.

Highway Maintenance Program

The brunt of the patching and resurfacing is borne by a fleet of eight motor graders. Each district has its grader, its dump trucks, and perhaps a front-end loader for the production of gravel. The districts having level earth roads, more or less easily maintained, have the oldest graders. The newest and best machines are in hilly country, where the maintenance of roads is a tough problem.

In the early spring these graders clean out all roadside ditches, and pile the material up on the far side of the highway shoulder. Then as the spring winds and sun dry the windrow, it is worked out across the road gradually so it will not impede traffic. When summer comes, the graders blade all the roads in their district constantly. One motor grader easily accounts for 10 miles of road in an 8-hour day, and the County works its machines 6 days a week.

In addition to the eight motor graders, each commissioner's district has one large grading outfit for heavy-duty grading and ditch cleaning. This consists of an Allis-Chalmers 75 tractor and an Adams No. 125 leaning-wheel grader with a 12-foot blade. For use in all districts there are also two Caterpillar Fifty tractors, two Caterpillar leaning-wheel graders with 12-foot blades, and a 210-cfm air compressor mounted on a 1½-ton GMC truck. These are employed in rock quarries and in conjunction with other equipment on heavy grading jobs where rock obstructions interfere with the operation of other machinery.

During the past few years county machines have started a rather extensive resurfacing of some roads in the southwest section. A few streams there have excellent deposits of alluvial gravel, rich in fines. How to get them out when the streams are high has always been a problem. This has been solved by putting an Allis-Chalmers 65-hp tractor on the job with an 8-yard LeTourneau Carryall in the summertime, when the streams are low. Last season this machine stockpiled 5,000 cubic yards of gravel in three weeks. When the stream filled up again, the stockpile was safe and ready to use.

One of the serious problems in past years has been the predominance of hedgerows along section lines and highways. Where these tall hedges were located, the shade retained early spring moisture in the roads. Furthermore, they were usually so dense that wind could not blow across the roads and dry up the moisture. Bourbon County recently received delivery on a new Caterpillar D7 tractor and bulldozer. It had more work than it could do all winter clearing mile after mile of these hedges off the land.

One of these hedges in a dry year will ruin a strip of corn 50 feet wide if it borders a cornfield. Long roots literally reach out and suck the nourishment from under the corn. You can imagine how this fact was played up in talking to the farmers, for they have consented by the dozens to the County's rendering this special service, and at

(*Continued on next page*)

A Roller For Every Job

Sturdy, heavy-duty rollers, engineered to stand up under the toughest conditions. Pierce-Bear Tandem Rollers are powered by economical Allis-Chalmers 4-cylinder industrial type gasoline engines. Variable weights, from 3½ to 5 tons with built-in water tanks for ballast and wet rolling.

Pierce Baby Bear 2½-3 tons

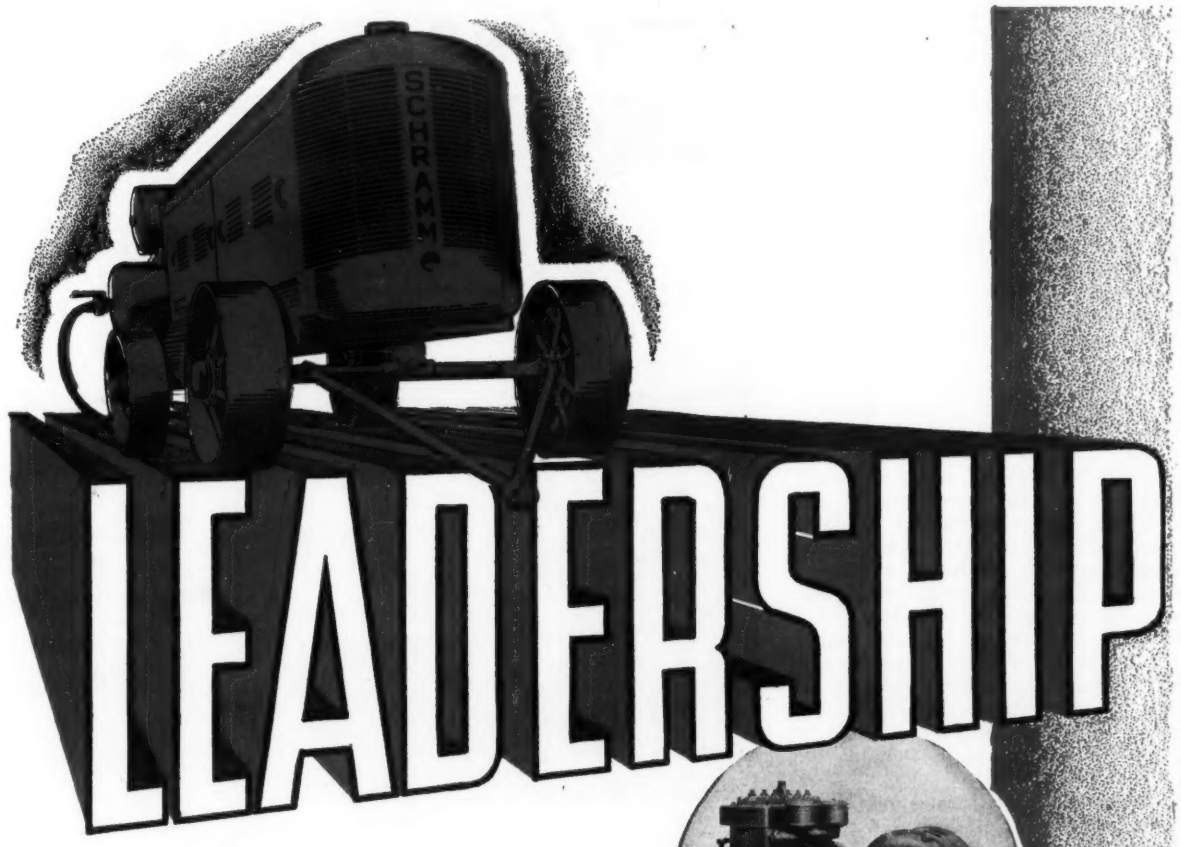
Pierce Medium Bear 3½-5 tons

The new 2½-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1½ inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.

Pierce-Bear Rollers

Lewis Manufacturing Company

415 Hoefgen Avenue—San Antonio 6, Texas



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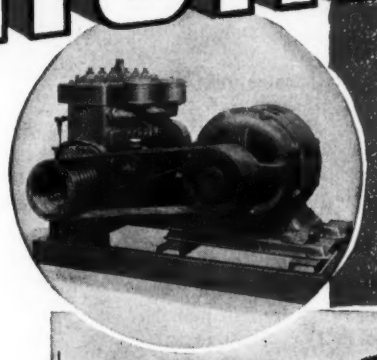
There is a rugged Schramm unit designed to take care of your Compressed Air needs. Contact branch nearest you or consult our engineering department for recommendations.



SCHRAMM INC.

THE COMPRESSOR P
WEST CHESTE
PENNSYLVANIA

Air WHERE, WHEN AND AS MUCH AS YOU NEED.

County Cuts Its Debt; Keeps Road Budget Up

(*Continued from preceding page*)

the same time ridding itself forever of a bad road-maintenance impediment.

In 1944 the County received a new International rubber-tired tractor and mower. This machine has now seen two seasons of continuous mowing, and the elimination of weeds has already done much towards improving the natural stands of low-growing grass along the county roads. Right-of-ways run from 40 to 66 feet here, but generally the mowing is limited to shoulders.

Bridges and Culverts

All the bridges and culverts in the county are maintained by Foreman Vernie Tottman with only five laborers. Many of the timber bridges built in the 1930's by WPA labor are now receiving some replacement of structural members, at least within the limits of the available timber supply. Rough fir which once sold for $28 per 1,000 FBM now costs the County in excess of $75, and deliveries are uncertain. The County uses as much local bur oak as possible.

So many of the timber culverts have failed recently that Tottman designed a prefabricated concrete box culvert in 32-inch sections which really works. He pours the 32-inch bottoms in pieces 4 inches thick and 24 inches wide. These sections also fit the top of the culvert. The sides are 12 inches high, but of the same dimension. A right-angled construction key 2 inches deep is formed by lumber at the time of the pour. Eight of these sections can be made at once in one end of the county equipment barn in Fort Scott. Tottman uses a Jaeger 10-S concrete mixer, Victor portland cement, pea gravel, and sand. He fits this activity in with his regular working schedule by pouring his prefabricated sections on rainy days. They are reinforced with various sizes of wire mesh, whatever is available.

If these prefabricated culverts sand in, they can be cleaned by a laborer with a shovel, by lifting the top pieces off and shoveling the silt away. When attempts have been made to pull corrugated-metal pipes clear, they have been bent and broken.

Tottman also prefabricates his own 48-inch sections of 24-inch ID concrete-pipe culverts. He makes these sections with 3-inch walls, and rods the concrete to get proper consolidation. This type of concrete pipe can be made at an average cost of $5 per section, or only $1.25 per linear foot.

County Equipment Maintenance

The nerve center of equipment maintenance is located in Fort Scott at the western edge of town. It consists of an equipment barn: a 300 x 45-foot rambling brick structure divided into four sections. The south section is the repair shop where tools and machines for working on heavy equipment are located. Next door is an open storage stall for automotive and heavy equipment. A third section contains enough room to hold about ten dump trucks. The north wing is devoted to the storage of lumber, cement, sand, aggregate, and a few other minor construction materials. The jigs for making prefabricated culverts and pipe are there.

C. & E. M. Photo

Inside the Bourbon County, Kansas, equipment barn at Fort Scott, mechanics work on a Case mower at left, and an Adams motor grader at right.

All mechanical repairs are made by a master mechanic and two helpers, who repair heavy equipment in the field or tow it to the Fort Scott shop. Equipment distributors in Chanute, Kans., and Kansas City, Mo., furnish spare parts. The spare-part situation, incidentally, is now more critical than it was during the war, according to Shop Foreman J. L. Mudd. The Bourbon County shop depends on genuine replacement parts from authorized distributors and does not attempt to make parts as a regular activity of the shop. As a matter of fact, the list of shop equipment is limited to the following:

1 Hammett Model 25 arc welder
1 10-ton hydraulic jack
1 blower and forge
1 anvil
3 bench vises and worktables
1 drill press, with Fairbanks-Morse gasoline-engine power
1 power grinder and buffer, with Fairbanks-Morse gasoline-engine power
1 Diehl power grinder and buffer
1 oxyacetylene outfit
1 Alemite high-pressure power-gun unit.

The County has its own gasoline

(*Concluded on next page*)

FOR SECONDARY ROAD CONSTRUCTION...
ARIENS AGGMIXER

The swirling, chopping action of these tines does a thorough job of mixing, wet or dry.

HERE'S equipment designed especially for mixed-in-place construction—to operate in connection with other general purpose equipment. Wherever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe and easy to operate . . . adjustable to any tractor . . . made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY BRILLION WISCONSIN

GET A LOAD OF THIS LOW-COST MIXING!

Speeding to your construction work, the new Ransome Blue Brute Horizontal Truck Mixer has a way of turning out the best in concrete at costs that mean money in the bank for you. Features like these are the secret of its always expert performance:

Exclusive drum design, stronger and lighter, with Ransome's famous mixing action . . . chilled car wheel metal rollers, each on two Timken roller bearings and running on extra-heavy, heat-treated track . . . smooth, positive gear-and-pinion drive . . . improved transmission with single lever control, two speeds forward and reverse, separate engine clutch and multiple disc reversing clutches . . . trouble-free water system with enclosed pump-clutch, leak-proof poppet valves and unbreakable anti-freeze gauge glasses.

Built with capacities of 2, 3, 4½ cu. yds., this new Ransome Truck Mixer is easier to start, to control, to maintain —a sure bet for time-saving, economical concrete production in transit.

Up above, of course, that's another Blue Brute leader — a Ransome "Big" Mixer — top performer at so many central mixing plants and big-time construction jobs . . . and another reason why *there's more worth in Worthington-Ransome.* 27-4

KNOW YOUR BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your planning on a profitable basis.

RANSOME EQUIPMENT
Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

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WORTHINGTON

Worthington Pump and Machinery Corporation. Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

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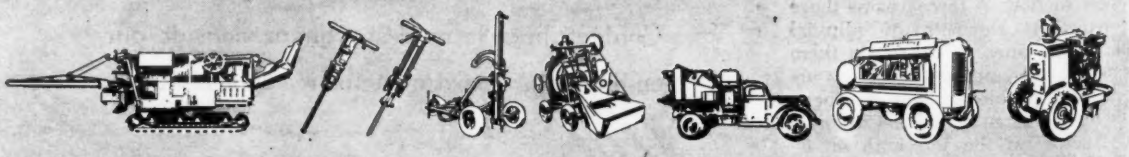


IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

County Cuts Its Debt; Keeps Road Budget Up

(Continued from preceding page)

pump at the central barn, and fuels up its own trucks and other vehicles. Dump trucks operate out of the county barn. Three Ford and Chevrolet trucks were scrapped and cannibalized to keep nine others running. Shop cards are kept up on repairs to all items of major equipment, and when new dump trucks again become available this system will be extended to those items.

New Construction

The new-construction program is pretty well embodied in the coming secondary-roads plan. With the maintenance of its existing system ranking high among Kansas counties, Bourbon hopes soon to be actively engaged on a still greater scheme of new construction by contract, under the supervision of the Public Roads Administration. These new bituminous highways, on a selected base of 1,000 tons per mile, will step up still further the carrying capacity of this county's modern rural road system.

Dirt-Loader Bulletin

A dirt-loader designed to meet the speed of present-day hauling equipment is described in bulletin No. 401 released by the Euclid Road Machinery Co., Chardon Road, Cleveland 17, Ohio. The Model BV loader has a maximum loading capacity of one ton per second, the manufacturer says. It is powered by a 150-hp diesel engine mounted on the rear of the frame. Engine speed is controlled by clutch operation. The clutch is operated by a hydraulic-control drive line from engine to head pulley.

The cutting blade of the loader is 9½ feet wide; it can make cuts up to 24 inches, depending upon the type of material and the width of cut. The angle of cut is adjustable in order to permit slope and grading work. The conveyor belt is 54 inches wide and 74 feet long.

The catalog has large unit pictures of the essential details of the loader, and the last page is devoted to specifications and dimensions.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 65.

N. C. Dealer for Lima

The appointment of a new dealer has been announced by the Shovel and Crane Division of Lima Locomotive Works, Inc., Lima, Ohio. The Interstate Equipment Co., Statesville, N. C., under the direction of its owner, K. C. Eller, will be sales agent for Lima shovels, cranes, and draglines in the state of North Carolina.

"THE SIGN OF EXTRA SERVICE"

It sure gave us a lift!

There's more than one way to load out trucks, but I never saw one that could beat this. We thought we used to do pretty well until our Oliver "Cletrac" dealer happened to drop in one day.

"Look," he said, "you're doing a good job of dirt moving, but here's a way to give the job a real lift. Put a new Drott Hi-Lift shovel on those Cletrac's of yours and watch the dirt fly. You see, this unit strips, scoops, carries, and dumps the dirt into your trucks. The deep shovel gets a full load every time . . . doesn't spill. It's pivoted so you can't help but get a bigger load and that means faster, more economical operation.

His suggestion gave our production a real lift. The Oliver "Cletrac" dealer sure knows his business and is a big help in ours.

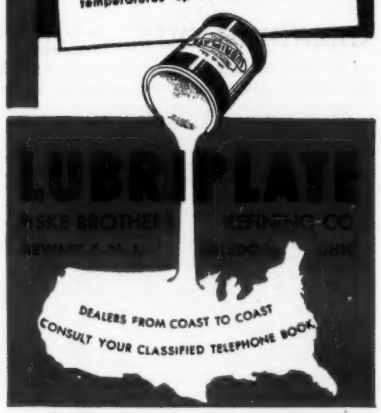
Cletrac
a product of
The OLIVER Corporation
Industrial Division: 19300 Euclid Ave., Cleveland 17, Ohio

MAKE ONE BEARING
OUTLIVE TWO!

LUBRIPLATE Lubricants actually condition bearing surfaces and stop progressive wear. They prevent rust and corrosion and resist steam, hot water, many acids and other adverse conditions. LUBRIPLATE is in a class by itself. Use it and make one bearing outlive two. Write or phone for facts and figures.

℞ FOR YOUR MACHINERY

No. 2 — Ideal for general oil type lubrication, ring oiled bearings, wick feeds, sight feeds and bottle oilers.
No. 8 — Because of high film strength and long life it reflects outstanding performance in most types of enclosed gears (speed reducers).
No. 107 — One of the most popular grease type products for general application by pressure gun or cups.
No. 70 — For a wide range of grease applications, especially at temperatures above 200 degrees F.
No. 130-AA — Known nationwide as the superior lubricant for open gears, heavy duty bearings, wire rope, etc.
BALL BEARING — This is the LUBRIPLATE Lubricant that has achieved wide acclaim for use in the general run of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.



BUY BONDS
BACK THEM

MARK well this button. It is worn by the men and women honorably discharged from the armed services. Though they are now in civilian clothes, let's not forget their service to our country and to us. They still rate our every consideration.

THE AMERICAN RED CROSS Carries On! **GIVE!**

Caissons Ar
For Building F

DRIVING RIG. The 30-inch steel cylinders for the foundation caissons under the central portion of a new industrial plant in New York City came in 70-foot lengths. They were driven by this special rig (at left above) designed and built by the Drilled-In Caisson Corp., an affiliate of Spencer, White & Prentis, Inc., contractor for the job. The rig is 110 feet from base to jib, with 90-foot fixed steel leads. A 45-hp boiler furnishes the steam for the Vulcan No. 0 single-acting hammer with a 30-inch driving head. The smaller 18 and 10-inch steel cylinders for the outer caissons were driven by a Vulcan No. 1 single-acting hammer (shown at right) operating in the 50-foot fixed steel leads of a Marion crane with a 55-foot boom.

SERVICE CRANE. An [illegible] crane [illegible] surv[illegible] driving [illegible] 5½-ton caisson cylinders and pl[illegible]m in a template which kept the cylin[illegible]act posi

CLEANING OUT. Below, the drill rig, which was mounted on steel skid beams, cleans out a caisson. A bailing bucket (right below) 10 feet long x 16 inches in diameter, with an outlet gate at the bottom and open at the top, was used to remove the broken-up material. Sand, silt, and muck was easily blown out by air jets, with a head of water maintained in the shell.

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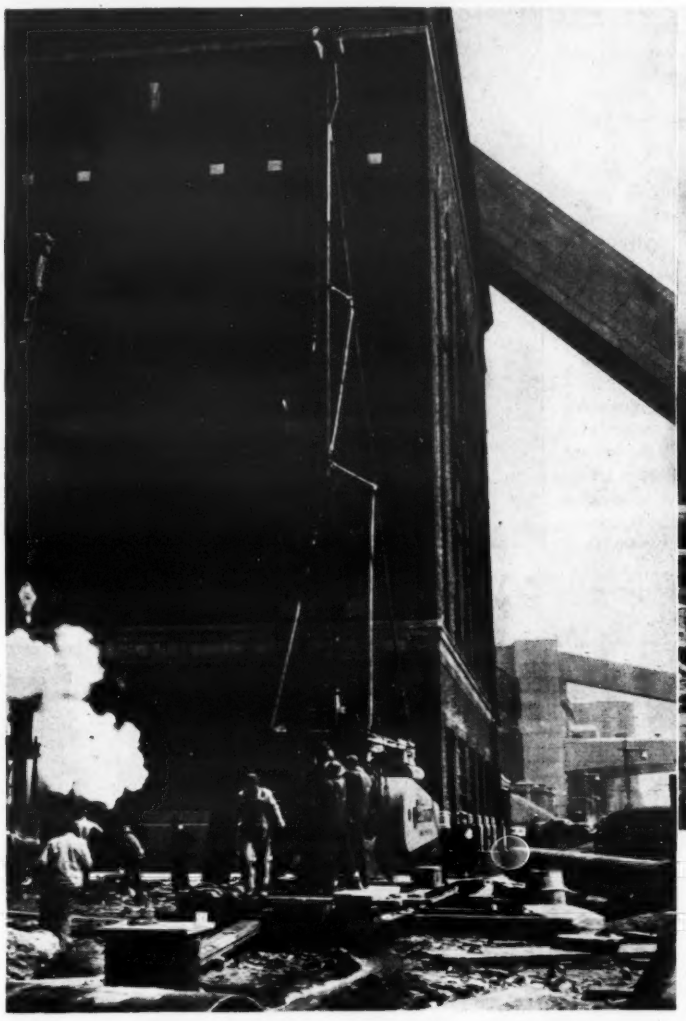
E. An crane with a 50-foot boom serv driving rig, picking up the s and pla m in a timber-crib guiding e cylind ct position during driving.

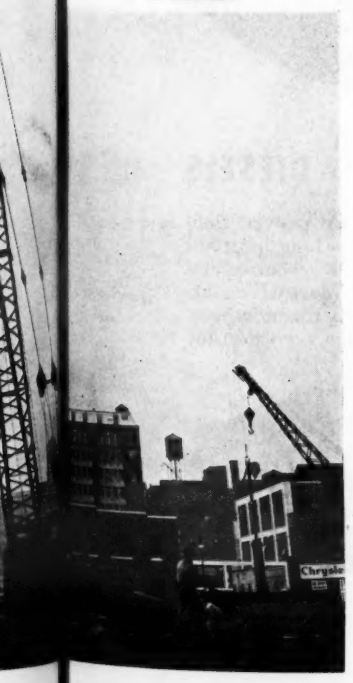


WHEN ROCK WAS MET. The filled-in ground on which this plant is being erected contained rock, boulders, old timber cribbing, and other obstacles. When these were met, a Bucyrus-Erie strong-back-type drill rig (at left), with a 42-foot mast and powered by a Buda gas engine, was set up over the caisson. The 15-foot-long drill carried a star bit (shown above) 5 feet long, 28½ inches in diameter, and weighing 1,800 pounds. It worked up and down with a 40-inch stroke inside the cylinder, breaking up the material. During the drilling the caisson was filled with water.

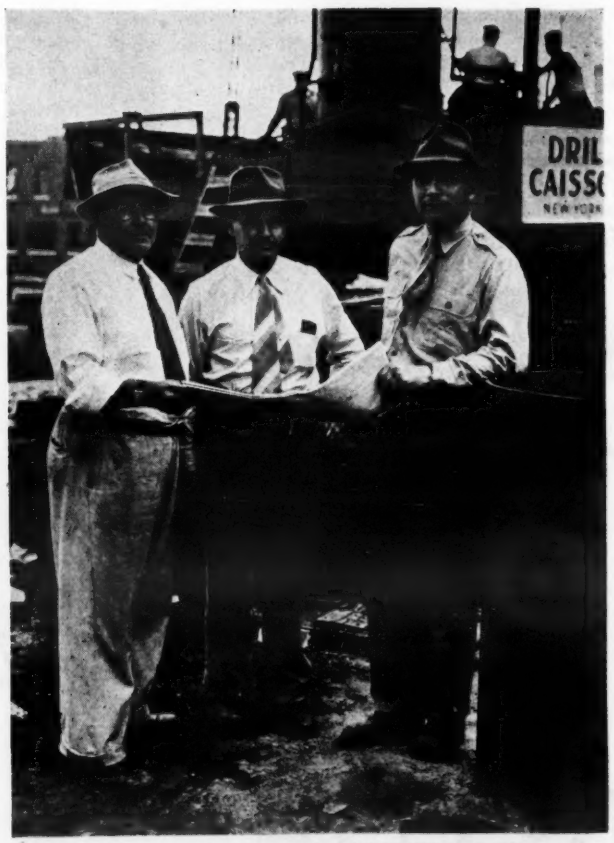
...g Drilled In ...g Foundation

Steel Cylinders Filled With Steel Cores And Concrete Go Down As Much As 145 Feet To Bedrock to Carry Heavy Load of New Industrial Plant in New York City

CORE STEEL. When the steel cylinders were driven to bedrock and socketed in the rock, a 1:1 mix of sand-cement grout was placed to make a watertight seal at the bottom of the caisson. The next step was placing the steel H-beam core which was embedded in concrete within the steel cylinder. The Drilled-In Caisson Corp. holds a patent on this type of foundation. Here a Lima crane with an 80-foot boom lowers a 50-foot length of core steel into a caisson.



CONCRETING. After the caissons were unwatered, ready-mixed concrete, of 3,500-pound strength in 28 days, was poured into the caisson shell. The concrete was chuted into place direct from the truck-mixers which delivered it to the job site.



THE MEN. Behind every completed project are the men responsible for its design and construction. Those in charge of this foundation job included (left to right) Harry Armstrong, Job Superintendent for Spencer, White & Prentis, Inc., of New York City; J. Edward Boyle, Field Engineer for the architect; and Daniel Barrows, Spencer, White & Prentis Job Engineer

Dual Street Rebuilt With Bituminous Top

Spread on Macadam Base With Gravel Foundation Beneath; Granite Curb At All Four Edges

✦ A 1,600-FOOT stretch of U. S. 6 running along the southern coast line of eastern Massachusetts was rebuilt last summer through the town of Fairhaven. A contract for this improvement was awarded to Contractor John Gallo of Sagamore, Mass., on his low bid of $50,787.50 to the Massachusetts Department of Public Works. At this point U. S. 6, or Huddleston Avenue as it is called through the town, has a dual pavement. Each strip is 23 feet wide and the two are separated by an 8-foot parkway.

No change was made in the street width. But a stronger type of pavement was constructed to replace the thin bituminous macadam, which was rough and broken and in need of almost continual maintenance. The old pavement was removed and the granite curbing lifted from its position along both sides of the dual roadway and the center dividing strip. Then a gravel sub-base was laid, covered with bituminous macadam, and topped with bituminous concrete. The job started the latter part of April, 1946, and was finished early in September.

There is heavy traffic along this road in the summer. So the northern half of the street was torn up first and completely reconstructed before any work was done on the other side; this prevented any tie-ups of traffic. The old macadam pavement was easily excavated by two Lorain ¾-yard shovels. The material was loaded into trucks along with from 1 to 2 feet of the old sub-base, depending on its quality. It was wasted in a low spot about a mile away from the project.

The granite curb was also entirely removed. This had to be reset later, when the contractor installed some new curb which was needed when two crossovers were closed off. The removal was by shovel, and curb setting was handled by a Hough Payloader. This compact mobile unit on six rubber-tired wheels was also equipped with a ¾-yard digging bucket. The latter was laid aside during the curb work, and a chain was hung from the boom of the machine which could easily lift and maneuver a 5-ton load.

New Road Base

The old roadway was then leveled off by an Adams power grader. After a new drainage and sewer system was installed, a ½ to 1-foot layer of gravel was placed on the grade. The material was obtained from a pit which was opened near Acushnet, 3 miles from the job site. A Lorain ¾-yard shovel loaded the gravel to a fleet of six trucks —Fords, Chevrolets, and Macks—with from 4½ to 9-ton capacities.

The gravel was spread by the power

(*Concluded on next page*)

C. & E. M. Photo

A Hough Payloader, with its bucket laid aside, sets in place a 2-ton 12-foot section of granite curbing on the John Gallo contract to rebuild a 1,600-foot stretch of dual bituminous-macadam pavement in Fairhaven, Mass.

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TROJON AIR HOSE COUPLINGS

MALLEABLE IRON—RUST PROOFED

UNIVERSAL TYPE—Locking heads of all styles and sizes interchangeable from ¼" to 1".

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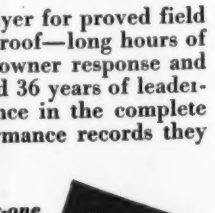

BUDA

15412 Commercial Avenue

HARVEY (*Chicago Suburb*) ILLINOIS

ual Street Rebuilt With Bituminous Top

(Continued from preceding page)

rader in two courses, and compacted y an Austin-Western 10-ton 3-wheel oller. The gradation conformed to the llowing requirements:

Sieve Size	Per Cent Passing
½-inch	70
No. 4	50
No. 200	5

Along the outside edges of the street he 6 x 18-inch sections of granite curb ere set vertically. But on each side of he center parkway the curb was laid ack on a 60-degree angle. This was one to increase the effective width of he street by enabling motorists to drive loser to the curb than they would if it ere set vertically. The new curb, in engths from 6 to 10 feet, was supplied y the E. B. Fletcher Co., Lowell, Mass., hich delivered it to the job after a 0-mile truck haul.

On top of the gravel a single 5-inch ourse of crushed stone was then spread nd compacted by the roller. Afterards it was penetrated, and then hoked with peastone cast from the ack of a truck at the rate of about 50 ounds to the square yard. The small tone was worked well into the interices of the base course with hand rooms and by rolling. The same trucks sed on the gravel haul delivered the tone after a 3-mile haul from the Blue tone Quarry at Acushnet.

The gradation of the base and choke tone is as follows:

Sieve Size	Per Cent Passing: Base Stone	Choke Stone
2¼-inch	100	.....
1¼-inch	0-50	.....
¾-inch	0-15	.....
⅜-inch	.....	100
½-inch	0-5	95-100
⅜-inch	.....	30-70
No. 4	.....	0-35
No. 8	.....	0-5

Bituminous Surface

The base stone received an applicaon of 85 to 100-penetration asphalt at he rate of 2 gallons to the square yard. his part of the work was done by the rimount Bituminous Products Co., hich sent a distributor from its plant t Everett, Mass., 70 miles away.

Following this came the spreading of he 2¼-inch bituminous-concrete pavement in two courses—1¼-inch bottom nd 1-inch top. The pavement work was one by Warren Bros. Roads Co., using n Adnun Black Top Paver, and hauling he material from its near-by plant at cushnet. The gradation of the material n the mix known as Type I follows:

Sieve Size	Per Cent Passing: Bottom Course	Top Course
1-inch	100	.....
¾-inch	40-65	.....
½-inch	10-25	100
No. 4	5-15	10-35
No. 10	15-30	30-45
No. 20	.....	4-16
No. 40	.....	6-20
No. 80	.....	5-16
No. 200	.....	4-9
Asphalt, 85-100 penetration	4-6	5-8

Quantities and Personnel

The major items involved in this ual-highway paving contract were:

Excavation	5,100 cu. yds.
Gravel borrow	3,100 cu. yds.
Crushed-stone base	2,600 tons
Asphalt penetration	20,000 gals.
Bituminous concrete	1,200 tons
Granite curb, new	659 lin. ft.
Granite curb, reset	5,300 lin. ft.

Michael A. Delaney was Superinndent for the contractor, John Gallo, sisted by Louis Andrade. Henry T. oward supervised the work of the arren Bros. Roads Co. About 20 men ere employed on the job. John Drislan as Resident Engineer and Frank A. ase, District Engineer for the Massausetts Department of Public Works, hich is headed by Joseph F. Cairnes, mmissioner, with P. H. Kitfield, Chief gineer.

This power burner may be used to provide high-temperature flame or to serve as a small compressor.

Power-Driven Burner Serves Dual Purpose

A dual-purpose power-driven burner, which may be used to provide high-temperature flame or as a small compressor, has now been released for general sale. The tank and burner were designed and are manufactured by the Aeroil Products Co., 5701 Park Ave., West New York, N. J.; the engine and compressor unit is made by Schramm, Inc., West Chester, Pa. The result, according to Aeroil, is a packaged machine without gears, belts, or chains.

It is said to be capable of throwing either a vertical or horizontal flame without affecting the volume or density. Regulatory air and fuel valves permit adjustment of flame from 6 inches to 15 feet long, with an intensity of heat up to 2,000 degrees F. The burner will work on kerosene or any oil up to No. 3 fuel oil.

The unit can be used for weed eradication on highway right-of-ways, rivers, or channels; repair work in maintenance shops; for straightening or bending metal; and related uses. Torches come in 4, 8, and 12-gallon capacities.

As a compressor, the unit can be used for running small air tools of various types, for it provides 20 cubic feet actual air. The skid model can be mounted on a truck; when fitted with a pressure tank and spray bar, it can be used to spray emulsions and concrete-curing materials.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 16.

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BLAW-KNOX CONSTRUCTION EQUIPMENT

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

What Are Subcontractors' Rights When Work Is Changed or Delayed?

A lawsuit recently decided by the United States Circuit Court of Appeals, Eighth Circuit, involved an adjustment of accounts between a contractor who constructed for the Government an Army Base near Fort Smith, Ark., and subcontractors who executed paving work on the job. The decision is a matter of considerable importance, because conclusions reached by the court involved legal principles with broad application to several aspects of construction contracts.

After the work was completed, the subcontractors sued in the name of the United States to collect from the contractor and his surety a balance claimed to be payable under the subcontracts. An award was made by the United States District Court at Fort Smith for less than the sum sued for. This was unsatisfactory to plaintiffs as well as to defendants, and all hands appealed.

The Circuit Court of Appeals ordered judgement for a sum much lower than had been awarded by the District Court. Here is the substance of the principal conclusions reached by the higher court (Blair, defendant-appellant, v. United States, plaintiff-appellee, 147 Fed. 2d, 840):

Third Party's Fault

The prime contractor was not entitled to reimbursement from the subcontractors for the cost of replacing under order of the Government engineer, portions of their pavement. The reason: the pavement defect was due to failure of the subgrade, which had been faultily constructed by another contractor. And guaranties of work by a subcontractor are by implication limited to defects for which he is responsible.

Effect of Speed-Up Agreement

Originally, the prime contract required completion of the job by March 24. Due to rainy weather, the date was extended to April 11. Later, by supplemental agreement between the Government and the prime contractor, the latter agreed to finish the job by March 26. The Government agreed to reimburse the contractor for additional costs approved by the contracting officer.

After an examination of correspondence which passed between the contractor and subcontractors, the Court of Appeals decided that the former did not obligate himself to pay the latter any additional compensation on account of the "speed-up", except as additional compensation might be allowed by the Government.

The contractor did by implication bind himself to turn over to the subcontractors funds apportionable to their work, if and when he was paid by the Government. But since he had received nothing and there was no claim that he had not diligently attempted to collect from the Government, he was not liable to the subcontractors.

Effect of Eliminating Work

The chief items of damage claimed by the subcontractors resulted from the elimination, under Government order, of about 60 per cent of the asphalt paving called for by the original contract. This phase of the case turned upon the fact that the subcontract provided a lump-sum price of $461,964 for the work contemplated by the original contract; eliminating some of the work reduced the price to $270,508. The court, in approaching conclusions upon this phase, said:

"Contracts for materials in building or constructing improvements may indicate that the one obligated to pay should pay only for the quantity of material actually going into the structure . . . . On the other hand, quantities may be stated in a contract only as estimates; in this event the quantities actually used in the work control, even though they fall short of the quantity stated as an estimate only . . . .

"If by law or contract the contractor agrees to variations in plans and thereby binds himself, a subcontractor may be bound to submit to alterations in plans, with the result that none of the parties may contend that their original contracts have been abrogated by the changes, although the result of compensation may vary materially by reason of the change. . . . . So, too, the contract may show that the parties anticipated that the quantity of work would amount substantially to what is set forth. . . . .

"The subcontract between plaintiffs and defendant Blair reflects an intention to contract with reference to a certain piece of work requiring a quantity on which the parties have substantially agreed. The provision for additions and deductions at the unit prices is in fact an agreement for compensation in the event of a change.

"Setting forth the unit prices does not necessarily mean that the subcontractor is merely to be paid for what may in any event be required. . . . . The contract must be so construed as to give effect to Article 7. And if this be done, it means that a substantial change in the work as contemplated could only be accomplished through agreement of the parties.

"We are referring to the contract between plaintiffs and defendant Blair. What is contained in the contract between Blair and the Government relative to changes can not modify the explicit contract between these parties, especially since the defendant is pro-

(*Concluded on next page*)

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TRUK-LODER CO. TIFFIN, OHIO

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These are Bethlehem's Type W (IWRC), Type W (fiber core), and Type U (IWRC)—three commonly-used varieties. Each is made for definite jobs, and one will not necessarily do the work of the others. Get specific details from Bethlehem representatives.

Too many people figure that rope is rope, and that what is good for one machine is just as good for another. That's like saying that the mainspring of a wrist watch would work in an alarm clock.

For example, a Bethlehem Type W rope is excellent as a hoist line in many applications. It's designed for this purpose. We seldom recommend it as a dragline. There is another Bethlehem construction (Type U) that is far more suitable for most dragline service.

Similarly, it pays to get the correct size, grade, lay, and core in every instance. Each of those factors is important; each has a bearing on the life of your rope.

Our tip is this: if you aren't sure which is the right wire rope for your job, ask a Bethlehem engineer for his recommendations. This specialized service is yours for the asking, and it may save you a lot of grief—and money.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

When you think WIRE ROPE...think BETHLEHEM

BETHLEHEM STEEL

Avoid Legal Pitfalls

(Continued from preceding page)

tected by the provision in his contract with the Government for an adequate adjustment in the event of a change."

Damage Claim Not Waived

The prime contractor and his surety contend as follows: that even if the work contemplated by the original contract was so far changed as to amount to a breach of that contract, the subcontractors waived the breach by accepting payments for the changed work. The Court of Appeals said that this did not follow.

"Where there has been a breach, the party not at fault may elect to continue performance and accept payment from the other party. If he does so, he manifestly waives his right to treat the contract as repudiated. But he does not thereby waive his right to sue for damages sustained because of the breach."

Measure of Damages for Changes

The Court of Appeals disallowed a considerable portion of the subcontractors' claim of damages. This claim arose from their having constructed an asphalt plant which would have been required had the work contemplated by the original subcontracts not been changed, but which was much larger than was needed for the job as it was changed.

First, there was nothing to show that the prime contractor was aware that the subcontractors had predicated their bid upon an assumption that it would cost nearly $70,000 to erect the larger plant. Second, the subcontractors were not entitled to include rental on equipment owned by them and set apart for performance of the work originally contemplated. Summarizing the applicable rules of law, the Court of Appeals declared:

"Expenses incurred by a party in preparation for performance of a contract, before its abandonment by the other party, are proper elements of damage caused by the breach .... and generally, where breach of a construction contract prevents performance, the damages are (1) what is expended towards the performance, and (2) profits that would have been realized by full performance .... We do not see, in the circumstances disclosed .... how charges for rent of the machines can be allowed. The machines belonged to plaintiffs. They were to be used on the project. Their use on the work might have produced no net profits. Whether any profits would have resulted if plaintiffs had fully performed is left to pure speculation, which is not sufficient as a basis for damages."

The court added this reminder: true, the United States Supreme Court has recognized that one aggrieved by a breach of contract is "entitled to be put in as good a position pecuniarily as he would have been by performance of the contract". However, "he is not .... entitled to better his condition nor to profit by nonperformance. We think there is a logical difference between expenses incurred and an allowance for the rent of machinery not in fact used. And there are practical reasons for allowing the one and rejecting the other. The contractor is out the expenses incurred by him, but whether he is out anything by not having used his machinery depends upon whether performance of the contract would have yielded any profit."

[A later decision, 150 Fed. 2d, 676, has completely disallowed this asphalt-plant item in the subcontractors' claim for damages. The court found, on reconsidering the evidence, no evidence of loss or out-of-pocket expense caused by the breach of contract. Since the subcontractors were seeking an award of damages, and not recovery of possible profits, evidence of loss was considered essential to support the claim.]

Dissenting Judge's View

One of the three judges hearing this case in the Court of Appeals disagreed with the majority conclusions just quoted. The persuasive reasoning of the dissenting judge, Circuit Judge Johnsen, suggests the possibility that other courts might concur with him rather than with the two associates who outvoted him as to what rule of law should be declared. Remarked Judge Johnsen, in part:

"To me the loss of the use of the excess equipment on other jobs and the rental value which the subcontractor could have received therefor, if it had not been committed to the performance of the canceled-contract work, are just as real and direct damages as any rental payment made by him on someone else's equipment would have been, which would have been recoverable under the opinion.

"If the subcontractor had sought to recover loss of profits on the canceled work, instead of foreseeable special and limited damages from having prepared to carry out his contract and having been prevented from doing so, he would have been required under the Arkansas law to include the reasonable rental value of his equipment as a cost or expense item in arriving at his profits, even though he was the owner of the equipment. . . . The present case seems to me merely to involve an application of this principle in transposition."

Delay Damages Denied

The subcontracts had been entered into and performed within the state of Arkansas. Therefore they were governed by the law of that state on such questions as liability for breach of contract. Applying that law, the prime contractor was not liable to the subcontractors for damages for delay in preparing the subgrade on which the subcontract work was to be performed. This was especially so since the delay was due to bad weather and other conditions over which the prime contractor had no control, and for which no provision had been made in the contract.

Extra Expense Allowed

The prime contract specified that the contractor would give the subcontractors three weeks' notice to set up an asphalt plant. When the work was speeded up, under agreement between the contractor and the Government, no such notice was given the subcontractors. Accordingly, the Court of Appeals decided that they were entitled to reimbursement by the contractor for the added expense involved in hauling asphalt 6 miles farther than would have been necessary had the asphalt plant been set up.

Interest Accrual

A recent case involved an award made by arbitrators in favor of a subcontractor against a general contractor. The Pennsylvania Supreme Court reaffirmed the rule that interest accrues on an award from the date of the award. (Weldon & Kelly Co. v. Pavia Co., 46 Atl. 2d, 466.)

Liable For Unguarded Ditch

The California Supreme Court decided that a sewer contractor's liability to a pedestrian who fell into an unguarded ditch on a foggy morning could be based upon violation of an ordinance. (Hopper v. Bulaich, 164 Pac. 2d 483.) This ordinance forbade leaving excavations open in a highway, without official permission, between sunset and sunrise. Said the court:

"True, under the ordinance the violation, if any, for which the defendant may have been prosecuted criminally was the failure to *obtain the permit* to leave the ditch uncovered. But if it be conceded that the only violation committed by the defendant was his failure to obtain permission to leave the ditch uncovered after sunset, that fact does not necessarily dispose of his civil liability."

Accordingly, the court concluded that if the circumstances reasonably required the ditch to be covered, to safeguard pedestrians, the contractor would be liable in damages (assuming, of course, that the pedestrian used due care for his own safety) for lack of an official permit to leave the ditch open.

Concrete-Arch Dam Built in Wooded Area

Structure Will Augment Present System of Water Storage for Additional Power for Village

✦ FAR up in northern Vermont surrounded by the Green Mountains lies the village of Morrisville, population 1,822 by the latest census. This village, by reason of its municipally owned electric light and power system, enjoys one of the lowest utility rates in the country. And it is taking steps to insure that the supply of power is not only maintained but also augmented for future needs.

The village is building under contract a new concrete-arch dam which will flood an area of 625 acres and impound about 758,000,000 cubic feet of water. Work on the new project, located on the Green River about 8 miles north of Morrisville, got under way in April, 1946. The dam is scheduled for completion early in 1947, with power expected on the line by next June.

The O. W. Miller Co., Inc., of Ludlow, Mass., is doing the job for the village Water and Light Department, which also supplies electricity to a population of from 7,500 to 10,000 situated in neighboring communities. From this outside sale of power and light, Morrisville residents have reaped the benefit of consistently low individual rates. They have also enjoyed this unique advantage: eleven taxless years during which the profits of this municipal venture covered the cost of local government.

The existing facilities consist of two hydroelectric plants, a 1,800-kw unit right in the village and a 600-kw unit at Cadys Falls, 2 miles away. The capacity of this latter plant is being increased to 1,300 kw per hour by the addition of another generating unit to permit more efficient use of the water which will be let downstream from the new dam. This work is being done by the same contractor as part of the general improvement. The present stations are on the Lamoille River, while the new dam is on the Green River, one of its tributaries.

Land Clearing

In clearing the 625 acres to be flooded, some of the most densely wooded area in this country was encountered. Forty years ago a sawmill in that area was abandoned, and since then the primitive road leading up from Morrisville has been all but obliterated by the undergrowth. The region was well-nigh inaccessible for exploration because of the thick forest. It was also made difficult of access by hilly terrain (the dam site is around elevation 1,300, or 600 feet higher than the village). Because of the difficulty in determining the amount and size of timber to be felled and underbrush to be cut, no responsible estimate could be given on the clearing item in the contract. So this phase of the work was done by the contractor under a cost-plus agreement.

C. & E. M. Photo
Lumberjacks cut a wedge on the side of a tree during land clearing for Diggins Dam, using a Disston 36-inch chain saw powered by a Mercury gas engine.

A force of 40 lumberjacks cleared the area using axes, saws, machetes, brush hooks, and three power saws on the big timber. To avoid confusion, the clearing

(*Continued on next page*)

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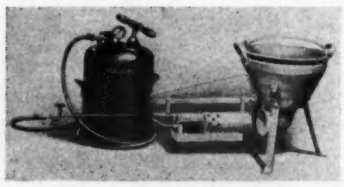

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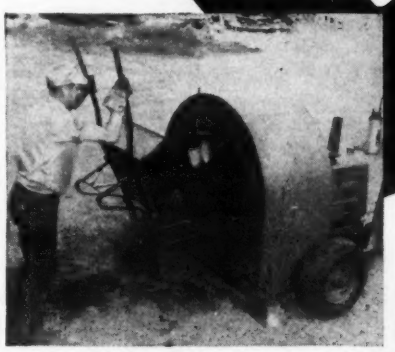

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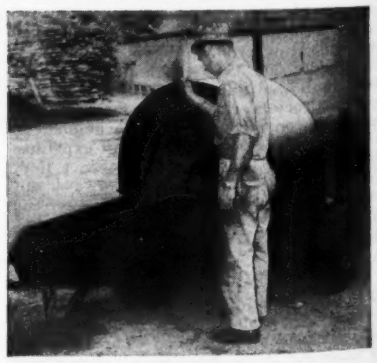

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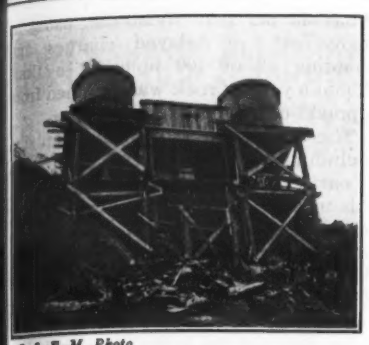

C. & E. M. Photo
This concrete batch plant, supported on piles and featuring big cement tanks, was set up on the rim of the gorge by O. W. Miller Co., of Ludlow, Mass., contractor for the Green River concrete-arch hydroelectric power dam.

New Concrete-Arch Dam Built in Wooded Area

(Continued from preceding page)

was done in three distinct operations. The first step was the cutting down of all trees over 10 inches in diameter. Second, all trees under this size were cut. The third and last move was the clearing and burning of the brush.

Three Disston 36-inch power chain saws were used on the big trees. Wedges were made on the side of the tree in the direction of the fall so that the timber would topple cleanly without binding. These wedges were made quickly by cutting a couple of slits with the power saw, 4 inches apart and 8 inches deep; afterwards a lumberjack with a few blows of a double-bit axe chopped out the wedge. Then a minute or two of cutting on the opposite side was enough to send the big tree toppling. The trees were cut off to within 3 feet of the ground and the stumps were permitted to remain.

All trees 5 inches and over in diameter were sold for processing into lumber. A lumberman from a near-by town set up a sawmill on the site and ripped the big logs into boards as fast as they were fed to the 4-foot blade. A Caterpillar D4 tractor with cable and winch was used to snake out the larger trees. These were cut into logs, piled on skids, and then pulled by the tractor to the near-by sawmill. The sale of this timber applied on the land-clearing cost.

Earth Dike

The new dam will have a drainage area of 14 square miles, while the flooded area will form a lake having 16½ miles of shore line. Eight small ponds are located within the drainage area, which has an annual rainfall of 40 inches. The elevation of the impounded water will be held at 1,220, which is the spillway-crest elevation of the new dam. At the southeast corner of the area to be flooded, about 2 miles from the dam site, the natural topography of the ground permitted a flow of water into an adjoining watershed. To prevent any loss of stored water, an earth dike 250 feet long was constructed to elevation 1,230 to block this natural pass.

The prime contractor wished to speed the project and to devote full time to the dam itself. So he sublet the dike construction to Derrick DeGroot of Jericho, Vt., who completed the earth embankment by July, 1946. In order to reach the site, he had to build a ¼-mile-long access road. But he obtained the material necessary for the dike right at the site. A Lorain ¾-yard shovel first dug a core trench along the dike center line to a depth of 10 feet below the original ground, or until hardpan was reached. The trench had a 2-foot width on the bottom with side slopes of 1 to 1. The entire site was also cleared of all vegetable matter, mud, and silt to a depth of 1½ feet below the original surface of the ground.

The trench was backfilled with clay, making an impervious core which was continued up to within 2 feet of the finished dike grade and with a top width of 6 feet. The rest of the dike was constructed of random fill excavated by the shovel and hauled by three International 3-yard trucks. A Caterpillar D7 tractor-dozer spread the material. It also aided in compacting by pulling a Bros sheepsfoot roller, with 7-inch feet, over the 12-inch layers. The finished dike has a crown width of 20 feet with 3 to 1 water-side slopes and 2½ to 1 land-side slopes. These were shaped by a Caterpillar power grader. The top of the dike averages about 20 feet higher than the original ground and required about 16,000 cubic yards of material.

Along the toe of slopes a layer of rock has been placed, and the slopes are covered with riprap to a depth of from 18 to 24 inches. Stone walls from abandoned farms supplied the riprap. The

(Continued on next page)

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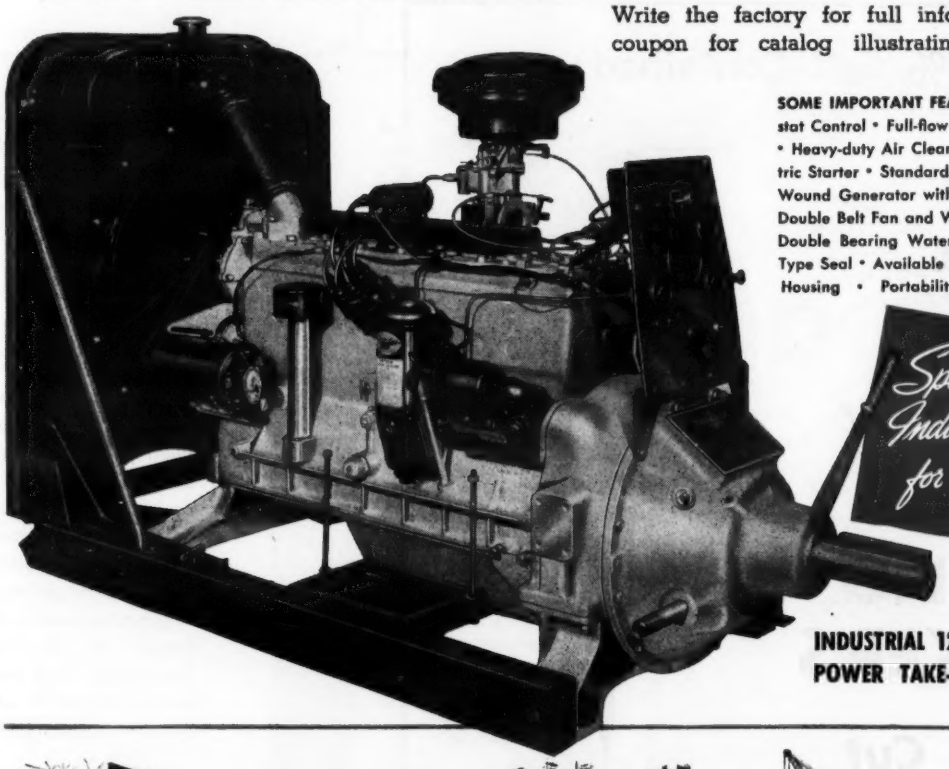

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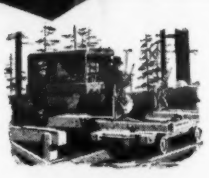
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New Concrete-Arch Dam Built in Wooded Area

(*Continued from preceding page*)

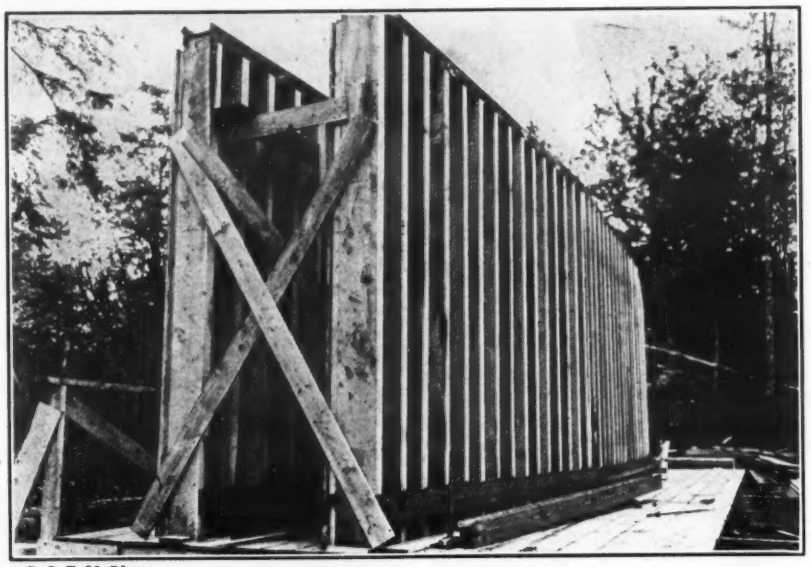
contract required only that the stone be dumped on the slopes, but the local contractor, taking pride in his work, set the pieces by hand. A crew of 15 was employed on this subcontract.

Diggings Dam

The new concrete-arch dam is known as Diggings Dam. It is at the lower or southwest corner of the area which is to be flooded by backing up the Green River. The structure averages 100 feet above the river bed and measures 360 feet on the arch, which has a 150-foot radius. At the center of the dam is a 60-foot spillway with a crest 5 feet below the top of the dam which is at elevation 1,225. The crown is 7 feet and the base 25 feet with a batter of 3 inches to the foot on the sloping side.

The gorge in which the dam is built is 165 feet deep with nearly vertical rock walls on both sides, assuring a good foundation for the structure. This contract does not include the powerhouse which will be constructed at a later date. Either a 1,000 or a 500-kw-per-hour generator will then be installed, depending on requirements.

On both sides of the river the dam site was cleared to rock; most of the overburden had accumulated on the east bank. Two draglines were used, a Bucyrus-Erie and a Link-Belt, each with 50-foot booms and Page 1-yard buckets. They loaded the material to two trucks, an International 5-yard and a Chevrolet 3-yard, which hauled it to a spoil bank only 300 feet away. With the overburden removed, steps of varying width and depth, according to the contour of the ground, were cut into the rocky sides of the gorge to serve as a foundation for the dam.



C. & E. M. Photo

Forms are shown here under construction for the downstream face of the concrete-arch dam on the Green River, near Morrisville, Vt. Some 7,900 cubic yards of concrete were required to complete the structure.

Drill holes for blasting were made by a Worthington wagon drill, two Worthington sinker drills, and one Ingersoll-Rand Jackhamer. These were powered by two Worthington air compressors, one 315-cfm and one 210-cfm, set up on the east bank of the river. Holes were drilled on an average of 3-foot centers both ways. Lifts up to 16 feet were blasted with American and Atlas 40 per cent dynamite, using as many as five delayed charges and shooting about 100 holes at a time. About a yard of rock was obtained from a pound of powder.

The total excavation at the dam site, including the benching, was 8,000 yards of earth and 2,500 yards of rock. When this material was hauled away, drilling of the foundation for grout holes got under way. About 300 such holes were drilled, into which grout was forced under pressure to seal the seams in the rock. Spaced on 10-foot centers in three rows, some of the holes were drilled 30 feet deep. Wagon drills were used on the deep holes with 1¼-inch drill steel starting at 6-foot lengths and increasing by 6-foot increments to 30 feet, as bit sizes decreased from 2¾ to 1¾-inch. On the shallower holes the Jackhamers employed 1⅛-inch drill steel with bits ranging from 2⅜ to 1½ inches in size.

Concrete Operations

While the foundation site was being

(*Continued on next page*)

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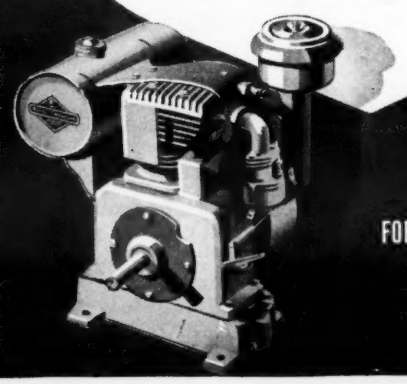

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New Concrete-Arch Dam Built in Wooded Area

(*Continued from preceding page*)

prepared, a concrete batch plant was set up on top of the gorge on the east bank just below the dam site. Two big tanks were a feature of the plant; 11 feet high x 11 feet in diameter, together they held 500 barrels of cement or a full carload. These tanks or bins of ¼-inch steel were obtained from an abandoned cement mill in Pennsylvania. The contractor wanted sufficient storage room so that a cement car could be emptied as soon as it arrived at Morrisville. Bulk cement was purchased from the Lehigh plant at Glens Falls, N. Y., and also from the Universal Atlas plant at Hudson, N. Y. It was shipped to the St. Johnsbury & Lake Champlain Railroad siding at Morrisville. There it was unloaded from a trestle into trucks and hauled to the batch plant.

Between the cement tanks were the two aggregate bins, a 20-ton bin for stone and a 10-ton bin for sand. The aggregate was bought from Albert Nadeau at Johnson, Vt., who delivered the material to the plant after a 16-mile haul. When the bins were filled, the sand and stone were stockpiled alongside; a truck-mounted Eagle loader and a Ford truck were used to fill the bins as needed. The batches were weighed on a Winslow beam scale directly beneath the bins, with the entire plant supported on piles or posts set into the hillside.

The batches were then discharged into the skip of a Koehring 16-S concrete mixer which was placed on a ledge beneath the batch plant. Water was pumped from the river by a Goulds 2-inch pump through 150 feet of line. From the mixer drum the concrete was chuted to a 2-yard hopper at the bottom of the gorge. From there it was dumped into two Blaw-Knox 1-yard concrete buckets. Each was carried by the Bucyrus-Erie crane to the forms or, if out of reach, to a transfer point, and swung over the forms by the other crane which had its boom changed from 50 to 60 feet.

Forms for the concrete were made of 1⅛ x 9-inch lagging backed by 3 x 10-inch studs on 12-inch centers. The sections were 40 feet long x 8 feet high and curved to a 150-foot radius, the same as the dam. A 9-inch steel I-beam was laid on top with its web running along the studding to serve as a wale. At the bottom of the form two 5-inch I-beams were used as a wale. When being placed, one section was set vertically while the opposite side was set on a batter of 3 inches to the foot. They were tied together about every 4 feet with two Richmond 1-inch anchors running diagonally from the top of one form to the bottom of the other. Horizontal strut ties also connected the forms at each stud, a 1-inch tie going 9 inches above the bottom of the form and a ¾-inch tie about 16 inches from the top. The latter was used when setting the next form above, as a loop was left projecting to which the bottom I-beam wale could be fastened. No other wiring was necessary.

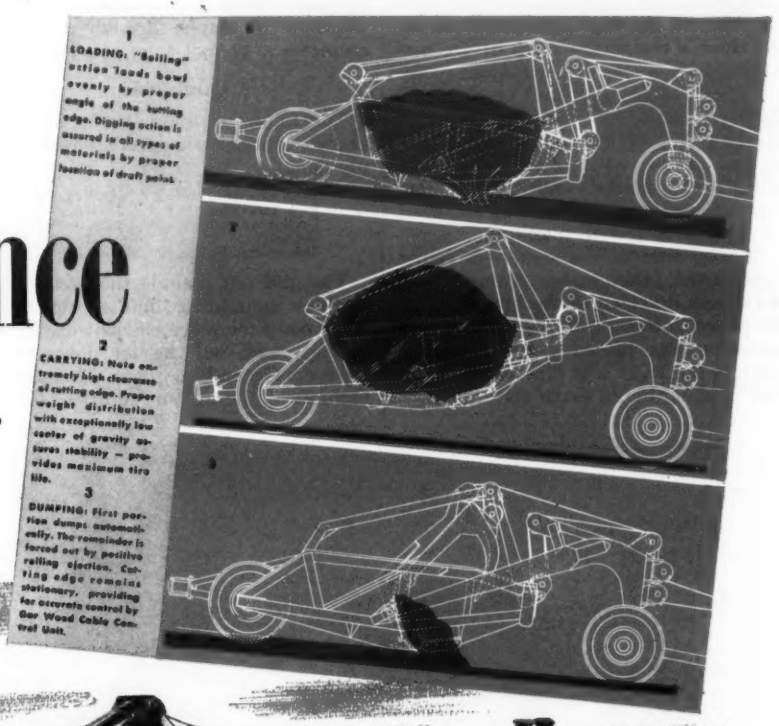
Three sets of forms were made so that alternate sections could be poured without delay. Pours ranged from 80 up to 280 yards in a day, with 7,900 cubic yards required to complete the structure. Before an adjacent section was built, 14 days were required to elapse. At each joint two 2-inch pipes were set vertically in the forms at the ends of the section, and were later removed before the concrete had its final set. These holes were filled with grout under pressure to take care of any possible shrinkage in the dam; expansion is relieved by the arch. A Gardner-Denver grouting machine was used in this operation, after the holes had been washed out with water both to clean

(*Concluded on next page*)

WHEN

Performance

COUNTS...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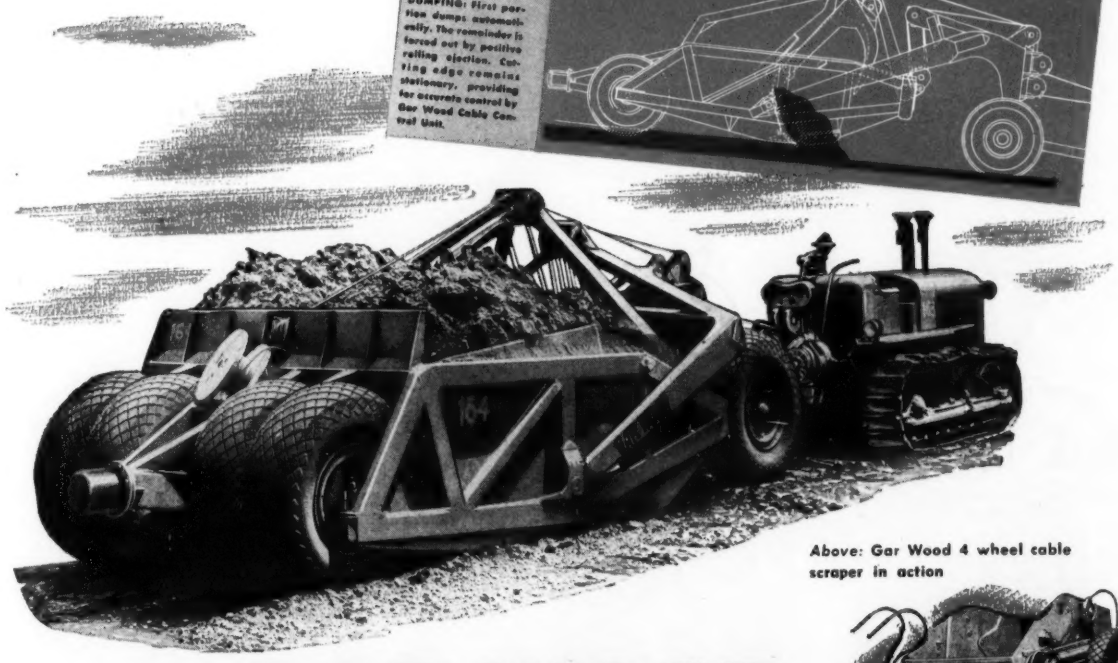
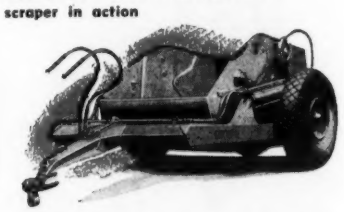


Above: Gar Wood 4 wheel cable scraper in action



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Below: Gar Wood cable dozecaster

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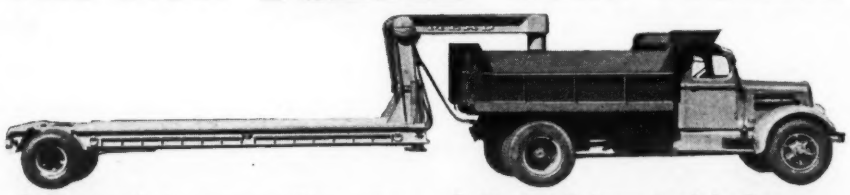

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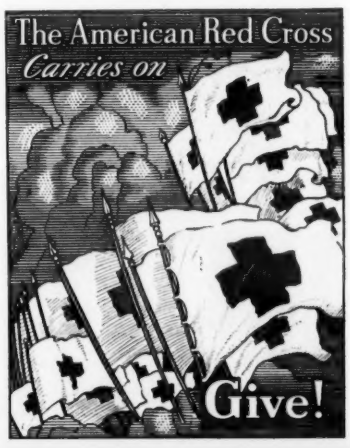

New Concrete-Arch Dam Built in Wooded Area

(*Continued from preceding page*)

them and also to wet the surface of the concrete. At the top of each 8-foot lift a key was made in the pour to effect a bond with the next section.

To build the upper half of the dam and also to get back and forth across the river, a temporary work bridge was constructed alongside the dam at an elevation about halfway to the top. Four-pile bents of posts with 10-inch tips and 12 to 14-inch butts were erected and capped with 12 x 12's. Across these were placed four 10-inch H-beams for stringers supporting a 12-foot deck made of 3-inch planking.

As one side of the dam was being constructed, the water from Green River was diverted to the other side of the gorge by a bag cofferdam. After the penstock was placed and the intake poured, the river was directed through that opening by an earth cofferdam.

Below the spillway apron a concrete weir was built 50 feet long x 7 feet high with 2½ feet of flashboard on top of that. The weir creates a stilling pool so that water will not freeze in the valves which are from 4 to 9 feet below the surface. It is also used to measure the output of water. The discharge is expected to be 200 cubic feet per second. By-pass valves in the dam will control the flow of water through a 6-foot-diameter x 40-foot-long penstock.

Quantities

The following major items were included in the work on this power-supply dam.

Earth excavation	8,000 cu. yds.
Rock excavation	2,500 cu. yds.
Drilling grout holes	3,000 lin. ft.
Concrete	7,900 cu. yds.
Reinforcing steel	38,000 lbs.

This did not include the addition of another generating unit at the Cady Falls plant for more efficient use of the water which will be let downstream from the Green River dam. This project includes building an addition to the north side of the powerhouse about 30 feet square. It will contain an adjustable-blade 1,000-hp water wheel and a 1,000-kva generator at 70 per cent power factor. The height of the present surge tank has been increased by 4 feet, and a new penstock built 8 feet in diameter and 85 feet long to handle the 42-foot drop. The complete cost of the entire project, including the land for the reservoir, will come to around $750,000.

Personnel

Charles T. Main, Inc., of Boston is the engineering firm in charge of the design and installation of the work. It is represented by Bernard S. Rose, Project Engineer, and Alfred H. Mellett, Resident Engineer. For the contractor, the O. W. Miller Co., Inc., Vice President James F. Moore is in charge, assisted by Dam Superintendent Paul Delskey, Clearing Superintendent Fred Burbank, and Powerhouse Superintendent Warren Partridge. A crew of 40 was employed at the peak of construction, not counting the lumberjacks who did the clearing.

Willard K. Sanders, Superintendent and Treasurer of the Water and Light Department, is supervising the construction of the dam for the Village of Morrisville.

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First, they are DIXON quality . . . your guarantee of long reliable service.

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Third, they eliminate delays due to replacement of mislaid or worn-out washers. Ground joint construction provides a leak-proof, soft-to-hard metal seal between stem and spud.

"GJ-BOSS"
GROUND JOINT, Style X-34
FEMALE HOSE COUPLING

For all high or low pressure steam, air, water, hydraulic, oil and gas hose. Corrugated stems and powerful grip of "Boss" Offset and Interlocking Clamps eliminate all possibility of blow-offs. Large wing nut facilitates coupling and uncoupling. Furnished in sizes ½" to 6", inclusive, with male or female spuds. Cadmium plated—rustproof.

"G J-BOSS" GROUND JOINT
AIR HAMMER COUPLING

The strongest, safest and most convenient coupling ever made for rock drilling, pavement breaking, riveting and all other heavy-duty air hose service. Furnished with strong "Boss" Interlocking Clamp. Compact Type, Style XLB-61, ½" and ¾". Heavy Type, Style XHB-72, ¾" and 1". Cadmium plated—rustproof.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods

IF IT'S A DIXON BOSS PRODUCT

IT'S DEPENDABLE

DIXON
VALVE & COUPLING CO
Main Office and Factory: PHILADELPHIA, PA.
BRANCHES: CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON

Show You Care
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CARE

Speed food to famine stricken countries in Europe. Net weight of food is approximately 29 lbs. Food is already cooked and easily prepared. Vitally needed supplies also in every package. CARE takes care of everything—package, shipping, insurance and guaranteed delivery—total cost $10.

Send BOTH remittance application and check or money order to CARE, 50 Broad Street, New York 4, N. Y.

The Foote Kinetic mixer is designed to handle all types of cold asphaltic mixes by a new mixing principle, said to provide a thorough coating of all aggregate particles with asphalt.

New-Principle Mixer For Asphaltic Mixes

A portable 3-cubic-foot mixer said to employ a new mixing principle has been announced by The Foote Co., Inc., Nunda, N. Y. The Foote Kinetic mixer is designed to handle all types of cold asphaltic mixes. It is claimed that the new mixing principle provides a thorough coating of all aggregate particles with asphalt, and that it makes possible the use of chemical additives to eliminate the need for drying wet aggregates.

In addition to its use for patching and paving asphalt areas, the mixer has been successfully employed, the manufacturer says, on asphaltic floor emulsions, sand, chemicals, concrete, and other construction and industrial mixes.

It is claimed that under good conditions the mixer will deliver two batches per minute: 5 seconds for charging, 20 seconds for mixing, and 5 seconds for discharging by a hand-controlled chute at the top of the machine.

The mixing action is accomplished by means of a revolving drum and three stationary blades. Material is held against the inside face of the drum by centrifugal force. An energy-converter blade peels a stream of material off the drum face, creating an end-over-end mixing action. Two cross-mixing blades provide side-to-side mixing. Asphalt is introduced into the drum by a Yale & Towne tri-rotor pump at a maximum rate of 8 gallons in 6 seconds. The pump is controlled by an automatic timer which closes the hand-operated control valve when the desired amount has been introduced. This pump can also be used for unloading tank cars of asphalt, the company says.

The mixer is powered by a 12-hp gasoline engine or an electric motor. Overall height is 58 inches, length 81 inches, width 68 inches, and approximate weight 1,500 pounds. Pneumatic tires used are 6:00 x 16. An adjustable truck hitch is provided for transporting from job to job.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 28.

Transformer-Type Welders

Information is now available on construction details, electrical specifications, and application data of the line of ac transformer-type welders made by the Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

The new booklet, B-3548, gives detailed information on the 500 and 400-amp industrial welders, the 300-amp welder, and general-duty welders ranging from 20 to 250 amperes. Electrical specifications and performance data are presented in chart form for easy reference.

The booklet is fully illustrated with interior views and close-ups of special features, as well as exterior views of each model. General application information concerning recommended electrodes is also included.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 85.

International Harvester Holds 1947 Press Preview

In celebration of its fortieth year of motor-truck production, the Motor Truck Division of International Harvester Co. was recently host to members of the press at a special preview in Fort Wayne, Ind., of its 1947 line of trucks.

The gathering was opened with the introduction of key members of the Division. Next followed a resume of the company's progress as a truck manufacturer. This was punctuated by a showing of trucks representing each decade of International production; it ended with a presentation of all the basic 1947 models including the new W series which is manufactured at the Emeryville, Calif., plant.

Following a luncheon, the company had arranged a trip through the Fort Wayne plant, which included a complete trip down the production line. This was followed by a trip to the truck-proving grounds where new models were put through their paces. The program was completed with a cocktail party and banquet.

Valve Maintenance Data

A handbook on valve reconditioning is now available for the asking from The Van Dorn Electric Tool Co., Towson, Md. The booklet describes the operation of valves in an internal-combustion engine, the salient features to follow in checking valves, and the procedure of proper valve maintenance.

The catalog also shows and gives directions for the use of the Van Dorn ine of Vibro-Centric tools in valve maintenance. Many photographs and drawings are employed throughout.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 90.

SPEED OPERATION for Snow Plows and Road Machinery with the . . . .

MONARCH New and Improved HY-LO-JACK

Fan Belt Driven

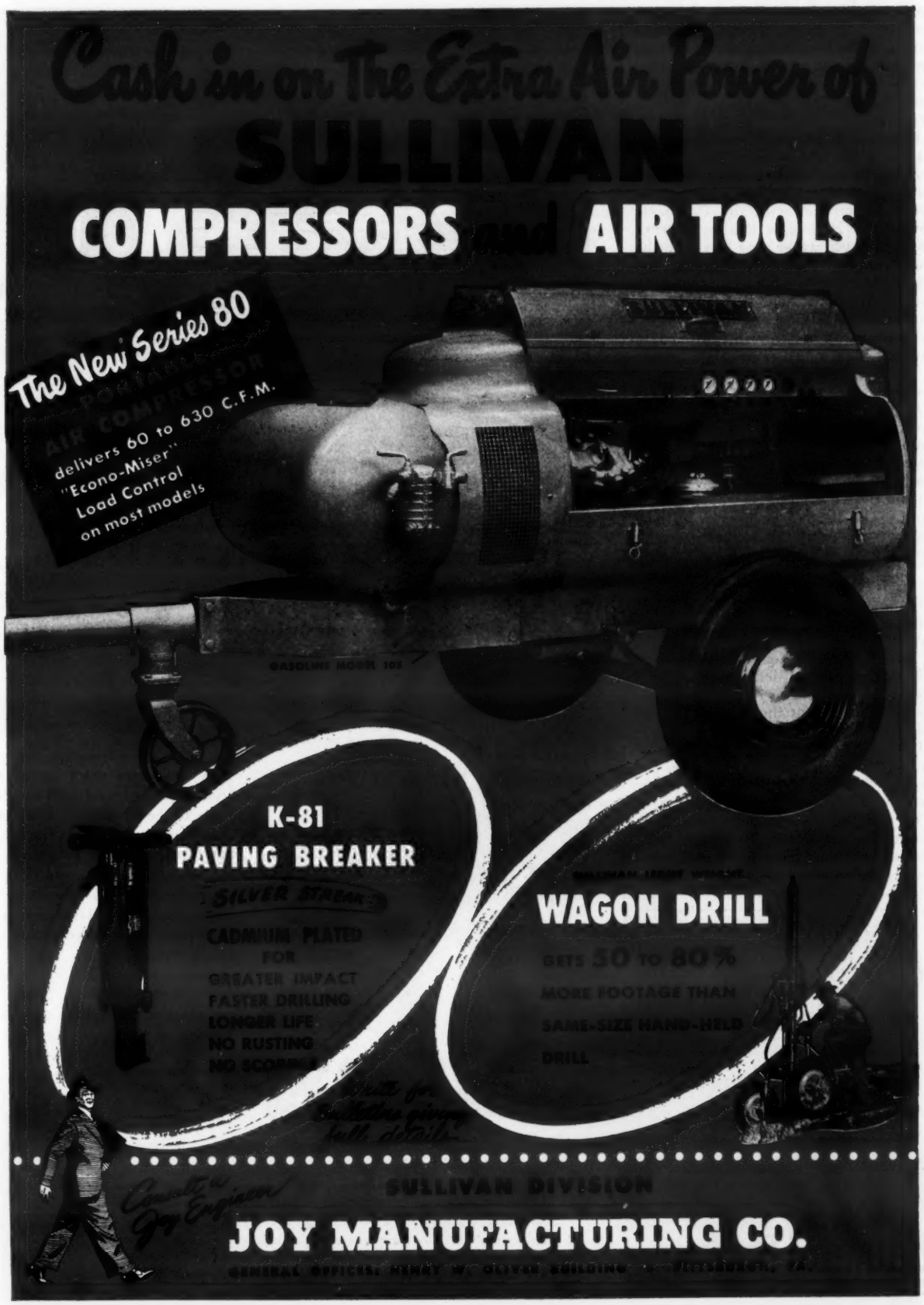
Power Hydraulic Control

Lifts plows ten times faster than hand pump. Cab-controlled. Easy installation on new or existing equipment. Priced for the most conservative budget.

WRITE FOR CIRCULAR H-75

MONARCH ROAD MACHINERY COMPANY, 327-329 Front Ave., N.W., Grand Rapids 4, Michigan

Cash in on The Extra Air Power of SULLIVAN COMPRESSORS and AIR TOOLS


The New Series 80
delivers 60 to 630 C.F.M.
"Econo-Miser" Load Control on most models
K-81
PAVING BREAKER
SILVER STREAK
CADMIUM PLATED FOR GREATER IMPACT FASTER DRILLING LONGER LIFE NO RUSTING
WAGON DRILL
GETS 30 to 80% MORE FOOTAGE THAN SAME-SIZE HAND-HELD DRILL
Consult a Joy Engineer
SULLIVAN DIVISION
JOY MANUFACTURING CO.

Giant Air Terminal Is Built on Mud Flat

Mountain Is Hauled Into San Francisco Bay Over A High-Speed Haul Road By a 73-Unit Fleet

✦ ROARING at 30 miles per hour over a smooth asphalt haul road 50 feet wide, a 73-unit hauling fleet has made earth-moving history near San Bruno, Calif. The fleet has included some of the largest haul wagons ever devised by man. Every 26 seconds these great units have rolled out of the loading pit with a heaped load, headed for the new 300-acre addition to the San Francisco Municipal Airport.

Destined to be one of the world's safest air terminals, San Francisco Municipal Airport has been receiving a $4,200,000 face-lifting job by the contracting firms of Macco Corp. of Clearwater, Calif., and Morrison-Knudsen Co., Inc., of Boise, Idaho, operating jointly. The tremendous earth-moving contract, totaling some 6,000,000 cubic yards for the airport alone, is being done for the City and County of San Francisco.

However, it must not be inferred that this is a straight airport job. Macco and Morrison-Knudsen have successfully blended a 5.097-mile Bayshore Freeway contract with the California Division of Highways, totaling $3,000,000; a $300,000 water pipe line with the San Francisco Water Department; and a $200,000 concrete-slab paving job with United Air Lines near the airfield administration center. All of this work has been so thoroughly integrated into one huge job that it is even impossible to write of it unless it is all treated as a whole.

At the time the project was visited, work had largely been finished on the United Air Lines parking apron. The main work schedule consisted of earth work centered around the new airport fill and the Bayshore Freeway embankment. The fleet of earth-moving machines was pouring 2,000 cubic yards an hour into these items.

The Airport Background

San Francisco Municipal Airport grew up near San Bruno on the mud flats of San Francisco Bay. Its growth at first was unpretentious. Back in 1927 Mayor Rolph dedicated the tiny first strip while Navy fighter planes roared overhead at the then-unbelievable speed of 180 miles an hour.

Under a new charter of the City of San Francisco, jurisdiction over the airport was transferred to a newly created Public Utilities Commission in 1932, and the present Manager, B. M. Doolin, was appointed. Since that time, several additions have been made, including 160 acres of fill built in 1944 by Macco and Morrison-Knudsen for the Army Engineers. For that project the contracting firms purchased a mountain of earth near San Bruno. They erected structural-steel overpasses across the El Camino Real Highway, the Southern Pacific Railroad double track, and the main U. S. 101 highway along the bay shore. They also built a high-speed haul road 50 feet wide from the mountain to the airport. This past work and company possession of the dirt supply helped to win the present contracts.

As San Francisco grew, air traffic literally swamped its airport. During the years, comprehensive studies of air-traffic needs were carried out. Finally a design and plan for the ultimate development of the airport were worked up by Manager and Chief Engineer Doolin, calling for a 4,000-acre field. In November of 1945 the voters of San Francisco by an overwhelming majority decided to authorize a $20,000,000 bond issue for the expansion of the air ter-

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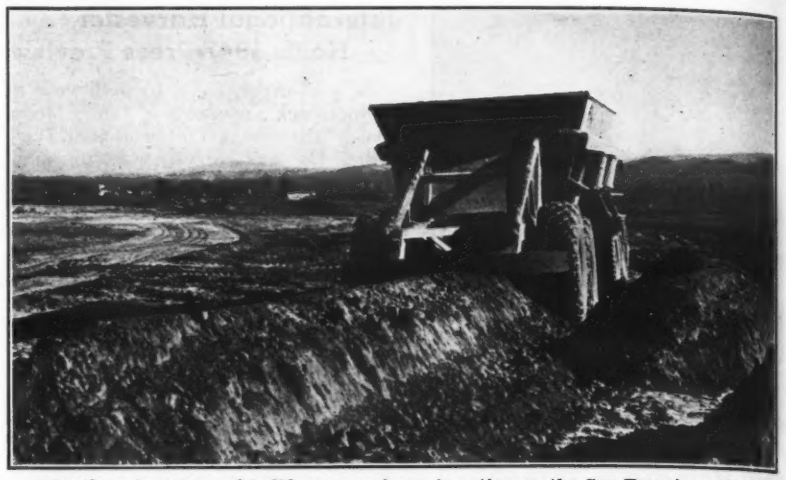
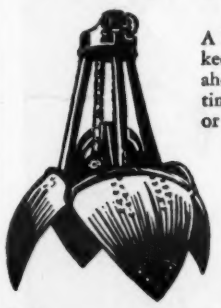


A Southwest wagon and bulldozer are shown in action on the San Francisco Airport fill. A layer of soft ooze on the mud flat, plus high compaction requirements, made the placing of fill a tough job.

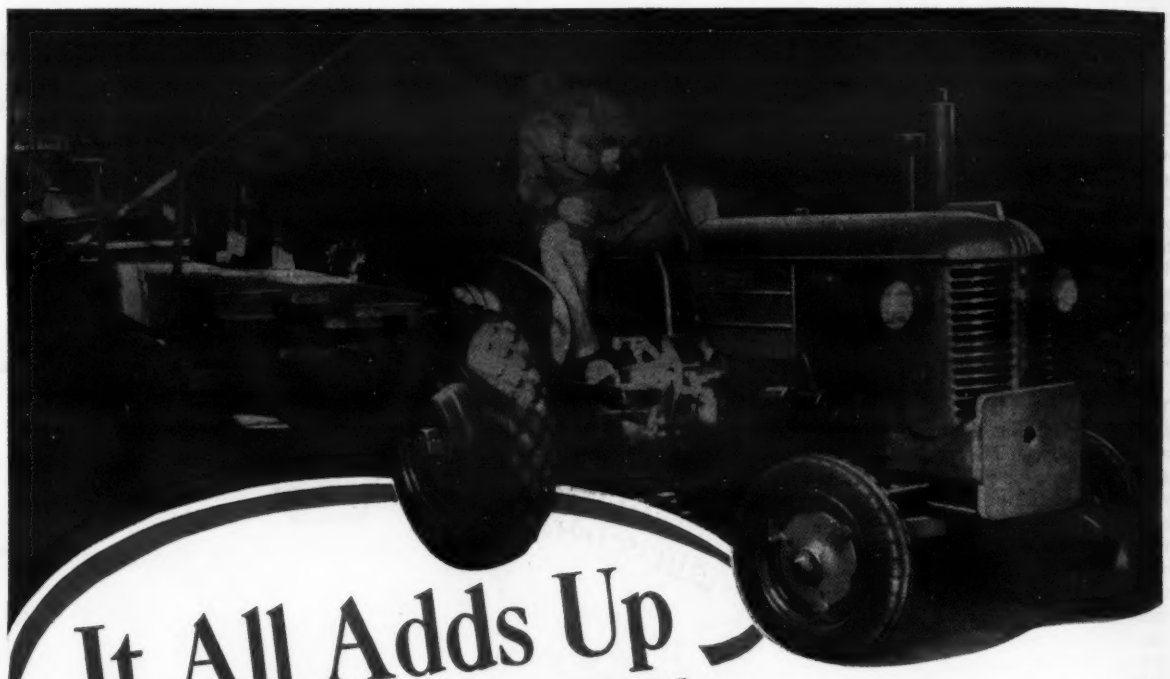
WON'T QUIT
or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets



It All Adds Up
TO GETTING THINGS DONE
FASTER . .

● Why does work go so swiftly, so smoothly, with a Case Industrial Tractor? In a nutshell, it's because these tractors don't have to be "babied." They're quick to start and ready to pull . . . right now! They have clutches that take hold like velvet, get going without faltering. The Case valve-in-head engine is a "lugger" . . . pulls as strong when slowed down as at full speed . . . saves countless seconds by skipping a lot of gear shifting. And then Case Industrial Tractors have ENDURANCE—more freedom from minor mechanical difficulties, long working life before major overhaul.

Shown here is Model "VAI," smallest of four basic sizes that cover a weight range from 2500 to more than 10,000 pounds, master a myriad jobs on streets and highways, in docks, warehouses, and industrial plants. J. I. Case Co., Racine, Wis.

CASE ★ ★ ★

See Your Case Industrial Dealer for latest information on the four sizes of Case industrial tractors, also on cranes, loaders, mowers, snow-plows, and all manner of tractor-mounted equipment. Take advantage of his trained personnel and shop facilities to keep your present equipment ship-shape. Let his varied experience help plan purchases of new equipment for the long pull ahead. Case "VAI" tractors are in regular production; keep in touch with your dealer about outlook for larger sizes.

A 16-yard Dixson wagon gets a heaping load of fill from a pit shovel, on the Macco-Morrison-Knudsen earth-moving contract for the San Francisco Airport and Bayshore Freeway.

Giant Air Terminal Built on Mud Flat

(Continued from preceding page)

minal over the mud flats and shallow waters of San Francisco Bay, in accordance with Doolin's plans. With further investments by the Navy and private airlines using the field, the total investment is expected to reach the $50,000,000 mark.

By the last of 1946, with contract operations in full swing, San Francisco Airport was accommodating 5,000 scheduled passenger airliner flights per month, plus another 5,000 unscheduled flights and air-freight departures. Small wonder, then, that the new field has been designed around separate runways: one for landing and one for planes taking off. That is going to make it one of the safest air terminals in the world. With water or low-lying ground near the airport, approaches to the field will be as safe as any in North America

Bayshore Highway

While the history of the new Bayshore Freeway is entirely separate from that of the airport, the necessity for its existence can be traced to the same common cause: the growing pains of an expanding city. The new express highway will ultimately carry heavy traffic over six lanes from downtown San Francisco past San Mateo and far on down the peninsula towards the city's environs. The Macco-Morrison-Knudsen section extends from Colma Creek to Broadway Avenue in Burlingame, and the job office for the airport is well centered within this highway job.

With more than enough available dirt in the company-owned property for airport and highway work, the joint contractors were in a very fine position to make the successful low bid before the California Division of Highways when the project was advertised.

Haul Road—Past and Present

Aside from the size and performance of earth-moving equipment, the high-speed haul road over which it has been traveling is one of the outstanding features of the job. Back in 1944 this road was built after moving 300,000 cubic yards of earth for its embankment.

In 1946 this 4-mile road was given from 6 to 8 inches of crusher-run base and 3 inches of plant-mix surfacing at the contractors' expense, in order to make it ultra-fast. Were it not for this road, the hauling of airport fill dirt would have been virtually impossible. Hauling wagons have rumbled over the El Camino Real, passing above a daily traffic count of 20,000 vehicles per day. There are 125 trains per day on the Southern Pacific railroad and 30,000 vehicles on the existing Bayshore Highway. All that traffic passes under the contract haul road.

The extremely heavy loads which have roared down this haul road offer an interesting study in high-frequency heavy-axle loading. Heaviest loads weighed 140,000 pounds and occurred about 860 times per day; about 2,900 loads rolled over the asphalt surfacing each working day. Consider this: each working day the haul road has carried the equivalent of 900 2½-yard shovels! The road has required a limited amount of maintenance but no repair, despite the fact that it was built from scratch without specifications.

With the advent of rubber-tired earth-moving equipment in the excavating field, more and more emphasis is being placed on the desirability of high-speed smooth-haul roads. Macco and Morrison-Knudsen have demonstrated here that this is economically justified. Moreover, the smooth pavement has canceled any necessity for

(Continued on next page)

HOT or COLD *Mix Asphalt*

DEPENDABLE

THE SIMPLICITY SYSTEM COMPANY
CHATTANOOGA, TENNESSEE, U.S.A.

NO OTHER TRUCKS EQUAL

ALL·WHEEL·DRIVE

For All-Around, Year-Around Construction Work

Top: Marmon-Herrington Heavy-Duty *All-Wheel-Drive* Truck.

Bottom: Marmon-Herrington *All-Wheel-Drive* Converted Ford.

No hill too steep—no sand too deep—no going too rough and rugged . . . that's the story wherever you find Marmon-Herrington *All-Wheel-Drive* Trucks at work.

Marmon-Herrington *All-Wheel-Drive* Trucks are "made to order" for tough construction jobs. Here are trucks with virtually the tractive power of crawler tractors—yet many times as versatile and fast. Here are trucks you can depend on to carry men, materials, equipment—*where you want them, when you want them . . . swiftly, safely, surely.*

Marmon-Herrington Heavy-Duty *All-Wheel-Drive* Trucks are available in 4-wheel-drive and 6-wheel-drive models—rated gross capacities up to 42,000 lbs. Converted Fords are available in all standard models, both 4-wheel-drive and 6-wheel-drive—capacities up to 22,500 lbs.

Discover how these great all-year, all-weather, all-purpose trucks speed operations, lower costs and increase profits. See your near-by Marmon-Herrington dealer, or write for literature.

MARMON-HERRINGTON COMPANY, INC.
INDIANAPOLIS 7, INDIANA

MARMON-HERRINGTON

Giant Air Terminal Built on Mud Flat

(*Continued from preceding page*)

maintaining motor graders on the job to dress the road.

Excavation and Hauling

The actual work of digging earth and moving it to the airport fill began on June 1, 1946, and was scheduled for completion by February 1, 1947. Work on the Bayshore Freeway is expected to be finished by the end of the 1947 working season.

Since the job involved a 4-mile one-way haul, fast rubber-tired earth-moving units were selected. Haul units were paced by 21 Peterbilt truck-tractors, with 200-hp engines, hitched to the newly introduced Model MX-30 Southwest wagons. These wagons haul 33 cubic yards and have air-controlled bottom-dump gates. Other haul units included 20 Dixson 16-cubic-yard clamshell dump wagons, and 32 standard 13-cubic-yard bottom-dump Euclids powered by Cummins diesel engines.

Three Bucyrus-Erie 120-B shovels with 6-yard dippers were selected for the loading of big equipment. Three Northwest 80-D's with 2½-yard dippers were moved in to load the Euclid units. A Lima 801 machine was brought in to do some structural excavation in connection with the new water pipe line.

Four Caterpillar No. 12 motor graders were selected for use on the fill at the airport and highway. And 16 Caterpillar D8's with cable-controlled bulldozer blades were brought in. Most of these bulldozers were used on fills, but several worked high up on a bench on the 260-foot pit face, pushing loose material down in front of the big shovels.

A double-spotting loading system was used at each shovel, and swing distance with the dipper loaded was held to a minimum. It was always less than 90 degrees. The pit floor was plenty big enough to allow the gigantic haul units to turn and maneuver. It was especially true in the case of the ponderous 120-B Bucyrus-Erie shovels that the spotter never allowed the shovels to be delayed. This man kept a haul unit in loading position at all times. By the same token, however, the number of haul units was balanced so delicately that they seldom waited very long for a load.

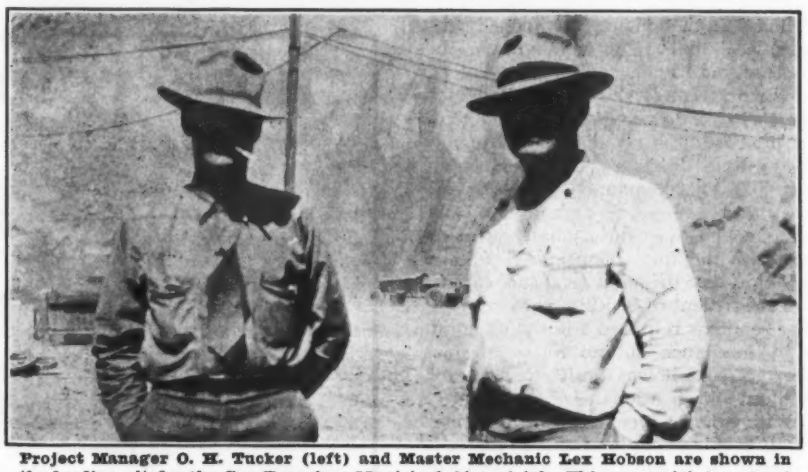
It is seldom that an equipment operator is newsworthy alone, but Project Manager O. H. Tucker employed a truck driver with no legs. This operator's name is Franklin N. Scott, a war veteran, and the astounding way Scott set a pace for others to follow was nothing short of phenomenal.

Tucker pointed out that Scott regularly pulled a 55-ton payload behind the Peterbilt truck-tractor. He said, "We had no hesitancy in placing him on this $28,000 piece of equipment. Neither the truck nor the haul unit is equipped with any special provisions to aid Scott in its operation. As a matter of fact, he is not assigned to any one machine and occasionally changes trucks during a shift!

"We have found Scott able to handle this equipment as well as any man we have on the payroll, if not better. During the Labor Day celebration he drove one of these trucks in the San Francisco parade."

Out of this toughest test of all, then, comes one answer to the question, "Can a veteran, minus arms or legs, be expected to do a good day's work?"

Project Manager Tucker ordered that all loaded wagons had the right-of-way over empties, and he saw to it that this order was obeyed. Aside from its safety aspects, the order speeded up earth hauling. It meant that in cramped quarters or on one of the structural bridges—anywhere where there was a choice to be made—a loaded 13-yard Euclid had the preference over an empty 33-yard Southwest unit. The system paid dividends.



Project Manager O. H. Tucker (left) and Master Mechanic Lex Hobson are shown in the loading pit for the San Francisco Municipal Airport job. This was a joint contract handled by the Macco Corp., and Morrison-Knudsen Co., Inc.

Placing Fill

One of the most ticklish operations of all has been placing the 300-acre artificial fill at the airport. For on the mud flat and underneath the shallow water is a layer of soft ooze, treacherous and unstable.

Try to correlate this difficult practical condition with the highly technical requirement of airport fill, and you see what problems the fill superintendent faced. The specifications called for 95 per cent compaction on material which "shall have a California bearing ratio of not less than 20 per cent at 1/10-inch penetration for a compacted and soaked specimen, and an expansion of not more than 2 per cent. That portion passing a No. 40 sieve shall have a liquid limit of not more than 40 and a plasticity index of not more than 12 as determined by AASHO Methods T-89 and T-91".

The only successful method of get-

(*Continued on next page*)

IN times like these it's doubly important to consider every piece of equipment strictly on *its own merits*. This is especially true of tractor-drawn scrapers because regardless of what make of crawler tractors you use, it's the scraper that handles the "payload," which in turn controls your profit on every job. To make the most profit then, it naturally pays to pick the scraper that will move the most yardage at the lowest cost under the widest range of job conditions.

While you hear a lot of "claims" about scraper performance, the fact remains that on hundreds of the world's toughest earthmoving jobs *LaPlant-Choate Positive Forced Ejection Scrapers are out-performing competitive rigs by a wide margin*. They're getting bigger "payloads" faster with less power . . . spreading them faster at the fill . . . and saving hours of costly "down time" for maintenance and repairs. Moreover, LaPlant-Choate rigs are getting these results in all kinds of materials including hard-to-load sand, rock, sticky gumbo, and whatnot. So why take a chance with inferior, unproved scrapers when you can make more money under more conditions with *job-proved* LaPlant-Choate rigs. Get the facts from your nearest LPC dealer. LaPlant-Choate Manufacturing Co. Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, Calif.

LaPLANT-CHOATE

Positive FORCED EJECTION SCRAPERS

FIRST in Value because they're FIRST in Performance

Giant Air Terminal Built on Mud Flat

(Continued from preceding page)

ting the material in that solid was to dump the heavy loads about 8½ feet thick at the edge of the fill, causing the mud wave to slide out and away from the dumped face. By surcharging the edge slightly with bulldozer-handled earth, all the mud was systematically rolled forward, leaving the dirt on solid material underneath. The fill edge was moved forward in progressive stages so no mud waves would be trapped within the fill area.

When a hauling wagon bottom-dumped its load, a bulldozer immediately pushed the material towards the edge. The top of the 8½-foot fill is approximately 3 feet above the high-tide mark of San Francisco Bay, and occasionally on windy days the bulldozers had to push up protective levees against the wind-lashed waves.

Although wet weather throughout the winter hampered the work, the job remained ahead of schedule. Earthwork progress on the airport was set up according to the following table:

Days From Initial Date	Required Volume Cubic Yards
60	820,000
90	1,640,000
120	2,460,000
150	3,280,000
180	4,100,000
210	4,920,000
240	5,740,000
250	6,000,000

The proper division of loads between the airport and highway embankment was handled on a day-to-day basis by fill superintendents under Mr. Tucker. Loads were taken where they were needed, while all equipment was operated at top speed and efficiency.

Care of Equipment

Nothing will emphasize the magnitude of earth-moving on this job quite so well as a description of facilities for maintenance, servicing, and repair of equipment. Think of a service station with 6 mechanics, working 24 hours a day, doing fuel business alone at the rate of 3,000 gallons every 8-hour shift, and you have some idea of the Macco-Morrison-Knudsen service yard.

As has been the past custom with shovels and scrapers, a mobile service unit mounted on the flat bed of a truck is maintained to make the necessary calls on pit equipment and crawler tractors on the fill. But there all similarity stops. Fast rubber-mounted off-the-road machines make their own calls for fuel and service.

A big yard has been set up with twin grease racks, and a long building which houses a heavy-equipment shop and an automotive shop. Five Peterbilt units can be accommodated simultaneously in the heavy-equipment shed. On-the-job repairs can be speeded because plenty of repair parts are in stock, and the welding shop has such equipment as a 27-inch lathe, a heavy Manley hydraulic press, a Millers Falls heavy-duty grinder, a Wright hoist, and plenty of Craftsman and Snap-on heavy-duty tools.

As much as possible this heavy job has standardized itself. Preformed wire rope, giving long service, is being used on all cable-controlled equipment. It is even being used on such installations as shovel-hoist ropes on the big Bucyrus-Erie power shovels.

"It is simply so far ahead of non-preformed rope in service and all-around economy that I believe it would be bad business to use anything else," explained Master Mechanic Lex Hobson. Hobson is trying another unique experiment. He has standardized on oils and grease for all equipment, even going so far as to use the same engine oil in passenger cars as he uses in the 200-hp Cummins diesels in the Peterbilts. The engine lubricating oil on which Hobson has standardized is

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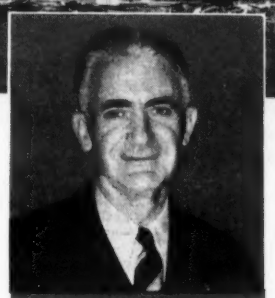

Walter J. Flach, Vice-Pres. Ohio Gravel Co.

● One of the largest and most successful operators in the United States, the Ohio Gravel Co., Cincinnati, Ohio, has six large plants serving southern Ohio, Indiana and Kentucky. All are in the Cincinnati area—at Cleves, Miami, Miamiville, Newtown, Red Bank . . . and the recently installed all-Telsmith plant at Camp Dennison. The latter is designed for a large output of 100% crushed chips.

Company management is in the capable hands of Fred W. Cornuelle, President; and Walter J. Flach, Vice-President, who is in charge of plant operations and new plant construction.

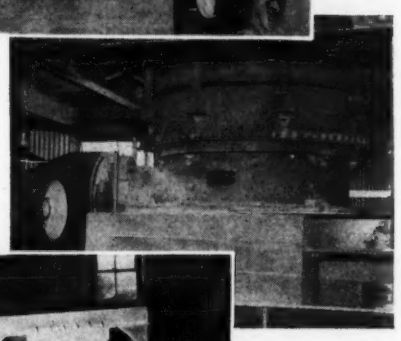
Heretofore Mr. Flach has designed the plants himself, personally selected all equipment, and purchased it from several leading machinery makers. This new plant is an exception. Mr. Flach decided to try a complete gravel plant service . . . and chose Telsmith. He is very pleased with results.

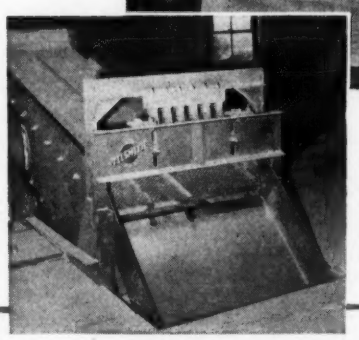
Mr. Flach gave his ideas and his preliminary layouts to Telsmith engineers. After analyzing his requirements, Telsmith submitted preliminary drawings with equipment recommendations, secured Mr. Flach's approval, then made detailed drawings for the complete plant. Telsmith equipment units were matched and balanced to assure a smooth-running plant.

Mr. Flach found that Telsmith Service relieved him of a great deal of technical detail. Installation was simpler, easier and faster. Telsmith Complete Plant Service means larger capacity, with a better product, at lower cost.

Telsmith's 40 years of engineering know-how are at your disposal. Consultation without cost. Send for Bulletin G-34.

Telsmith 13-B Gyratory Crusher


Telsmith 48" Fine Crushing Gyrasphere


One of the two Telsmith 4' x 12' Double Deck Vibro-King 2-Bearing Finishing Screens

G-15

TELSMITH Equipment in this plant

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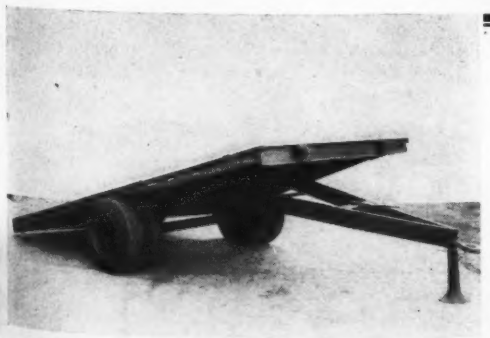

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DON'T SKIMP!

Franklin N. Scott, legless veteran of both World Wars, continues his 25-year career as a truck driver by "highballing" a Cummins diesel-powered Peterbilt tractor and Southwest wagon on the San Francisco municipal airport improvement project.

Giant Air Terminal Built on Mud Flat

(*Continued from preceding page*)

Standard of California RPM heavy-duty mineral-base lubricant. RPM No. 140 gear lubricant is being used for the common lubrication of all gears. Hard-facing of bucket teeth and lips is being done by E-13-J manganese rod, distributed by the Welding Service Co. of San Francisco.

The period of greatest activity in the grease pit is on the graveyard shift from 10 p.m. to 6 a.m. When the six grease monkeys swarm over a piece of heavy equipment, it takes only 11 minutes to grease and fuel that unit.

While these equipment-maintenance methods are not in any sense experimental, they are a radical departure from conventional practice in many localities, and contractors will be interested to learn that Lex Hobson has not lost a single bearing or oil ring throughout the job.

Personnel

The job is being headed by Project Manager O. H. Tucker of the joint contracting venture. George Haensel is General Superintendent, Mickey Daley is Fill Superintendent, and Buck Hope is Night Superintendent.

A. J. Wehner, who has supervised all field construction for the City since expansion of the airport began, is the Construction Engineer for the City of San Francisco. Henry Simard is Resident Engineer of the Bayshore Highway for the California Division of Highways.

Helmets for Head Safety

The complete line of Skullgards made by Mine Safety Appliances Co., Braddock, Thomas, & Meade Sts., Pittsburgh 8, Pa., is described and illustrated in bulletin No. DK-13, now available. These protective helmets are made in a wide variety of shapes and styles to suit the special needs of men in construction work, pit and quarry operations, and other activities where head-injury hazards exist.

Skullgards are high-pressure-molded from a tough, hard, laminated Bakelite material said to have high dielectric strength and unusually high fracture resistance. These features provide effective deflection of falling and flying objects, the manufacturer says. The helmets will not soften, swell, gain in weight, or deteriorate from exposure to water, oil, perspiration, or common chemicals, the company also says. They are light and provide for self-ventilation.

The Skullgards are available with either a standard hat-sized lining or an adjustable type, both replaceable. For cold-weather use, a winter lining can be provided. It consists of a skullcap and earlugs made of durable fabric.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 96.

Light 10-Hp Engine

An air-cooled 10-hp engine, weighing 97 pounds, has been announced by D. W. Onan & Sons, Inc., 1436 Royalston Ave., Minneapolis, Minn. The Model CK 4-cycle engine is designed to have performance and service characteristics of a water-cooled engine, and yet maintain the light weight of the air-cooled type. Built of aluminum, it has large fins, giving each cylinder over 340 square inches of cooling surface.

An optional feature is a direct-connected electric starter which is built into the fan-wheel housing. This starter also serves as a generator, during operation of the engine, for keeping the battery charged. The CK has a 3-inch bore, 2¾-inch stroke, and a 38.8-cubic-inch piston displacement.

The CK engine, now used as a prime mover for new Onan electric plants, is also available for general service.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 29.

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ALLIS-CHALMERS 2-CYCLE DIESEL TRACTOR WITH BULLDOZER AND SCRAPER

Nearly all the dirt-moving jobs involved in the construction of a road can be handled with this fast-stepping combination. It's practically a one-man roadbuilder. You can use it three ways . . . with both scraper and bulldozer at the same time or with either unit alone.

There's the bulldozer for leveling, tearing down banks and other 'dozer work. There's the 2-wheel scraper for regular cut to fill dirt-moving. . . plus handling a multitude of other jobs. Rear-dump feature widens its usefulness. You can place material exactly where you want it — over slopes, around bridges, culverts and other close places. It is especially handy for digging trenches for pipe and culverts, making driveways and approaches and cleaning ditches.

An ideal, all-'round outfit for townships, cities, counties . . . it's a mighty useful combination for all contractors, as a principal dirt-mover or as an auxiliary unit. Takes over much of the work of bigger, more expensive equipment and relieves hand labor. It will pay you to investigate this one-man roadbuilder. Get all the facts from your Allis-Chalmers dealer.

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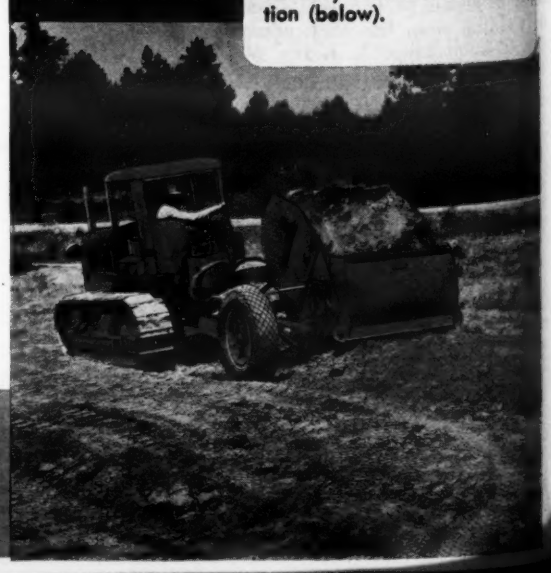
GREATER SUSTAINED PULLING POWER of Allis-Chalmers Diesel Tractors and exceptional digging ability of Gar Wood 2-wheel scrapers enables you to load toughest materials quickly—including gumbo, hardpan and shale. The new HD-5 (above) is the ideal tractor for efficient work with the 3-yard scraper. For larger capacity . . . HD-7 tractor and 5-yard scraper is the correctly matched combination (below).



ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Road Maintenance

(*Continued from page 1*)

is in Utah.

Through this state pass about 23,100 miles of roads and streets. Approximately 5,400 miles of the vast system were built under state and Federal-Aid construction programs, and now are maintained by the State Highway Department. But one of the governing factors, past and present, which is decidedly in favor of the maintenance force, is Utah's policy of sound construction design. Now, as in the past, all new construction involves the use of surface-drained dense embankments, topped with pervious material underneath the slab.

Utah's roads began originally as graded paths. When gravel surfacing was popular at the close of the first World War, the State began to consider better alignment and wider right-of-ways. Today, some of those same gravel roads are giving excellent service. They have been covered with asphaltic concrete or portland-cement concrete, and traffic-compacted gravel of earlier years is still carrying the load.

Present-day highway design calling for a pervious gravel blanket under the slab was in use on Utah's system 20 years ago. Now this State is moving as rapidly as possible towards 240-foot right-of-ways with controlled access on main highways. Her pervious blanketing is being produced by today's improved rock-crushing machinery, in order to obtain more of the interlocking effect of crushed rock particles.

These are the conditions of design and construction which have such a vital bearing on maintenance. As difficult as it is, Utah's maintenance job would be decidedly more difficult today, if better-than-contemporary construction had not been followed in the past. Shackled with worn equipment, hampered by lack of new machines, the Department still points with pride to the condition of its highways. Impartial comparison of riding surfaces, snow removal, roadside development, right-of-way and shoulder maintenance clearly establishes Utah's highway system as one of the best in the Rocky Mountain states.

Maintenance Organization

Utah is divided into six maintenance-construction districts, each supervised by a district engineer. Each of these districts has an average of 40 maintenance foremen. Some are working foremen; they have a motor grader with assigned portions of road and shoulders to maintain. Some have two-man crews, and a few have three men. Each district has a resurfacing gang, with equipment to rip up and re-lay obsolete or worn bituminous highway.

C. & E. M. Photo

A windrow of crushed rock gets a shot of Nostrip, in addition to asphalt, during a "half-sole" repair job by State forces in Utah. Nostrip is an additive to make asphalt adhere to rock particles.

Each of these maintenance foremen is responsible to the district maintenance engineer for patrolling his assigned section of road, and for making the necessary repairs promptly. It is also up to these maintenance foremen to make recommendations for replacement of highways, after they have served their original purpose. They order repair materials, plan repair work, and administer a safety program as well.

This extensive maintenance organization is run from Salt Lake City headquarters, through the district engineers, by State Maintenance Engineer Ray Gillis. He is responsible to Chief Engineer Roy W. McLeese, and the three-man Road Commission headed by Chairman Ray Leavitt.

(*Continued on next page*)

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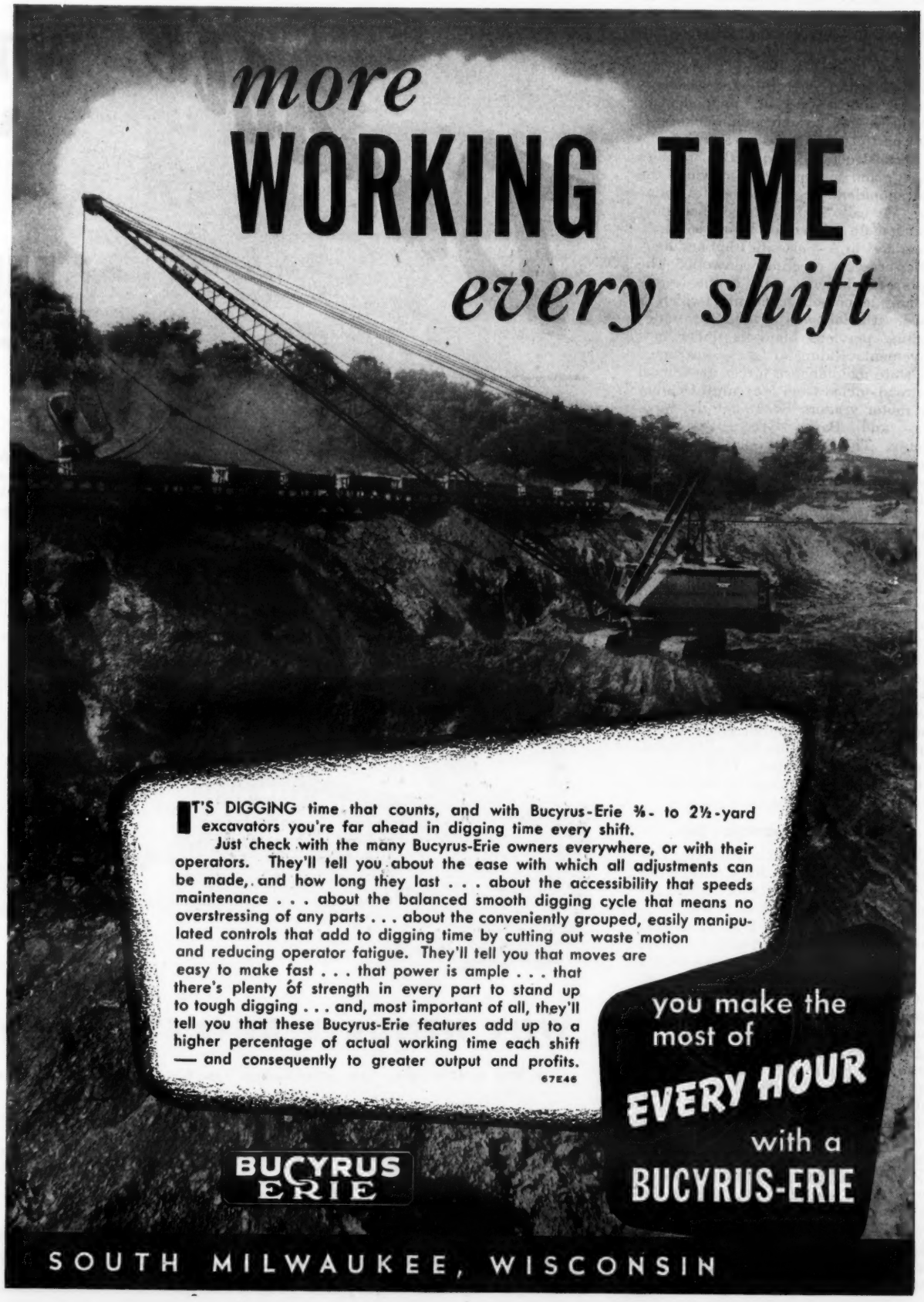
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Road Maintenance

(*Continued from preceding page*)

The State also has a central repair shop, located in Salt Lake City, for making major repairs to heavy equipment regardless of which district owns it; each district, of course, has its own shop and storage yard on a much smaller scale. The Salt Lake City repair shop acts as a clearing house for parts, and overhauls broken-down equipment when a district brings it in. If it is possible to install repair parts in the district shops, the district shop foreman and one mechanic do this work.

Long-Range Maintenance Program

Utah's maintenance program might well be called a "reconstruction program". For the maintenance department is now engaged in extensive widening of highways that are considered too narrow for today's traffic. The 18 and 20-foot bituminous roads which are still in serviceable condition, so far as riding surface is concerned, are being widened to a minimum of 24 feet.

Funds for this work come from the $750,000 annual betterment program, derived from registration and gasoline-tax receipts. A per-annum budget of $2,000,000 for straight maintenance is also partly used for reconstruction.

Reconstruction frequently involves tractor and scraper work to widen the old shoulders, or to accelerate drainage. It calls for extensive sheepsfoot and smooth rolling, for Utah's soils run from A-1 to A-8 classification and densities are very carefully controlled. The California bearing ratio is the testing technique of soil mechanics which is used. It is followed to the letter in designing pervious blankets under new pavement. Riding surfaces constructed by state maintenance forces are almost all road-mixed from May until October by motor graders, Seaman Pulvi-Mixers, and Barber-Greene traveling plants. The State has standardized on slow-curing asphalts for road-mixing, and rapid-cure high-penetration cutbacks for sealing.

The purchase of two Seaman Pulvi-Mixers for each district has solved what formerly was an extremely troublesome problem in road-mix. These machines mix and dissipate rolled-up blobs of road oil in one pass. They have proved particularly useful when summer fades into late autumn, and the weather approaches that marginal condition when the success of road-mixing is doubtful. Each district owns at least one of these machines. Some have two. By purchasing them when motor graders were not available, Utah has helped its hard-pressed grader situation. With a Pulvi-Mixer in the line-up, fewer motor graders are needed to do a job.

Typical Reconstruction Job

When the Utah State Highway Department was visited for CONTRACTORS AND ENGINEERS MONTHLY, a typical repair job was being done on U.S. 91 north of Cedar City. U.S. 91 at that point crosses an ancient sink. Legend in that country recounts many stories of horsemen who mired down and sank out of sight in the old days of Indian fighting. Over a period of six years from the last maintenance work, this highway had settled more or less uniformly for a distance of 2,800 feet. It was down about 2 inches from its original grade. Movement of the entire embankment had also caused corrugations to appear in the old bituminous pavement.

When the district maintenance superintendent made a final inspection just prior to ordering repairs, he decided the best thing to do was to road-mix 2 inches of new surfacing, and lay it down on the existing black-top pavement. What he recommended was a modification of the usual bituminous patch which old-time maintenance men call a "half-sole job".

C. & E. M. Photo
A Galion motor grader and Allis-Chalmers-towed Seaman Pulvi-Mixer do a thorough mixing job during Utah maintenance operations. Note the absence of asphalt gobs.

A district Pioneer rock crusher was set up in one of the lime-rock deposits used by the State, located about 13 miles from the job. Output from this crusher was trucked to the project and spread along the west shoulder. In dumping this windrow, the volumetric content was calculated at 400 cubic feet per station, and dump trucks were strung out on that basis. Had this job not been so extensive, crushed rock from a state-maintained stockpile 2 miles away might have been used, for adequate repair stockpiles are kept up along all highways.

As the rock was crushed and sent to the job, the foreman made several routine samples and sent them to the Salt Lake City laboratory to be checked for soundness. He ran his own screen analyses. When this job was about 90 per cent hauled, the state laboratory discovered that the crusher was running out of sound rock, and was approaching that point where the rock might break under a heavy roller. State headquarters immediately ordered the crusher to move back to get the remainder of the rock from the back part

(*Continued on next page*)

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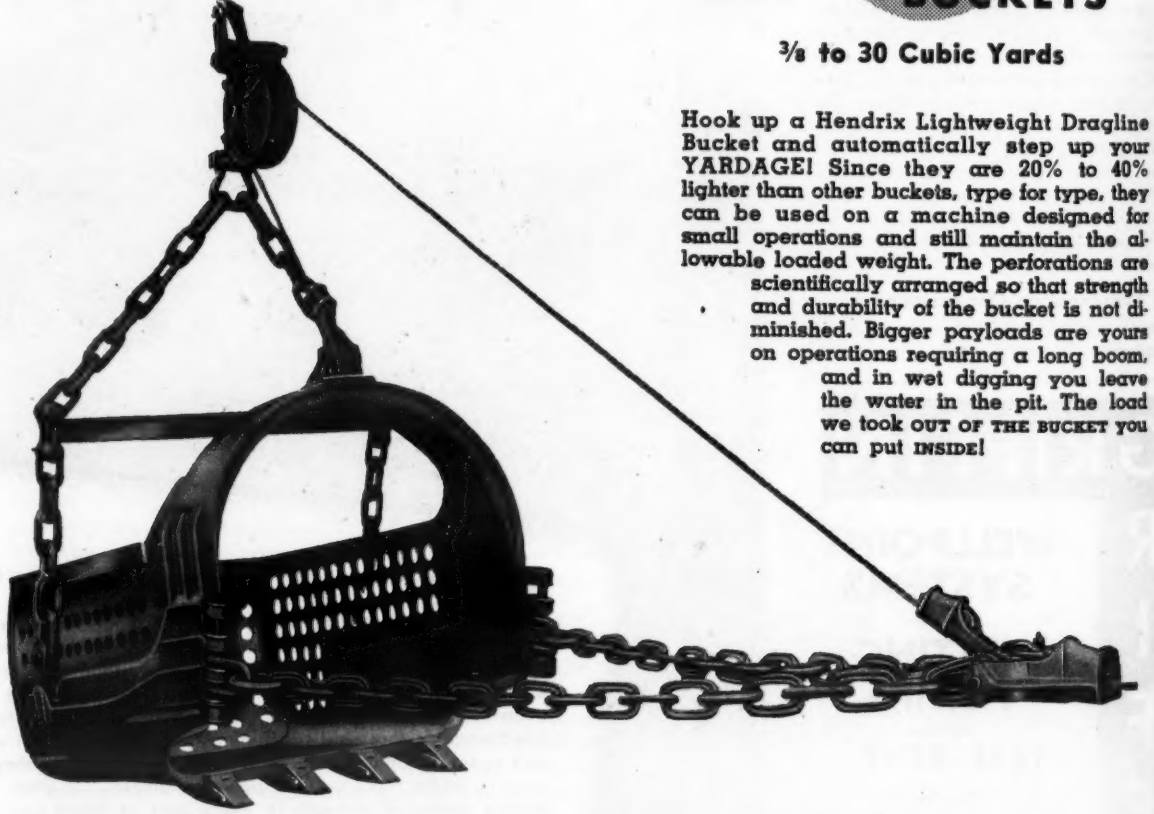

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Road Maintenance

(Continued from preceding page)

of the pit, and when the job was finished to abandon the pit.

As the rock was hauled out to the road and dumped, a flagman was stationed at the dumping end to slow traffic down and to control the dumping of material. The placing of "Slow", "Stop", and "Warning—Repairs Ahead" signs were his responsibility, for the prevention of accidents while routing traffic through a job is highly important in Utah.

When all the crushed rock had been screened to minus ¾-inch size, and dumped along the road shoulder, the road-mixing machines and asphalt distributor were brought in. Two Galion Model 101 rubber-tired graders were moved up from a near-by job. An Etnyre pressure distributor mounted on a GMC truck was assigned to haul and spread the road oil and additive.

The material was flattened 12 feet wide and about 4 inches deep by a pass with two of the motor graders. The weather was cool and windy, so a light application of 0.6 of 1 per cent of No-strip was put in the aggregate and mixed with one pass from a motor grader followed by a pass of the Seaman Pulvi-Mixer. Approximately 3½ gallons per foot of windrow of SC-3 asphalt, heated to 225 degrees, was then applied by the pressure distributor. All this asphalt was put in the material in one shot.

Following right behind the distributor, a motor grader bladed the material back to windrow form. The Seaman Pulvi-Mixer passed over the crowned windrow behind the grader. Its paddles dug deep through the material, mixing rock with asphalt and throwing the mix at high speed up against its baffle plate in the back. This machine flattened a windrow completely in a single pass, breaking up the concentrations of asphalt and mixing it with crushed rock. Two motor graders followed behind it, blading the mix first towards the shoulder and then back towards the roadway.

This operational sequence was carried on for three days, due to cool weather, to obtain a perfect mix. In hot weather of midsummer, this same group of machines regularly mixes and lays a half mile of resurfacing in an 8-hour day. As the weather cools off towards the end of the season, greater care and more time must be expended to get the same high standard of quality.

When the rock particles were all covered with asphalt, and the windrow looked black instead of pepper-colored, SC-3 asphalt was applied 4 feet wide on both roadway edges. Maintenance men have found that this light prime of 0.1 gallon per square yard effectively holds a half-sole job at the edges, where bad bonding and raveling sometimes occur. The hot oil was applied by the same distributor, using the same oil, as was used for shooting the road-mix oil.

Motor graders began to cut into the material and spread it in ½-inch layers over the road. A Huber 8-ton tandem roller was then used to consolidate the mix. The windrow was worked in on the road in this manner, and rolled down tight, until the final 2-inch patch job was finished. Traffic at the rate of 3,000 automobiles per 24-hour day was handled either through the job, or down one of the shoulders.

C. & E. M. Photo

Spot repair on the Utah state highway system is done here with a Galion motor grader, shown ripping up the bed surface. Note the flagman in the background.

Next, the finished surface was given a tack coat of 0.25 gallon per square yard of RC-4 asphalt, with 15 pounds of minus-¼-inch chips applied and rolled in. The finished pavement was turned over to traffic immediately when that was finished. When the district painting crew passed over this section of highway, the striping was added.

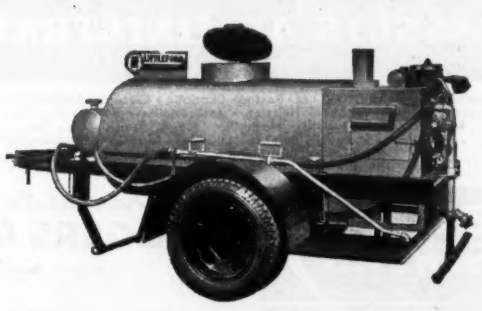
On shorter patches, where no large amounts of crushed rock have to be produced, the material is hauled from stockpiles and processed in very much the same way.

Routine Maintenance

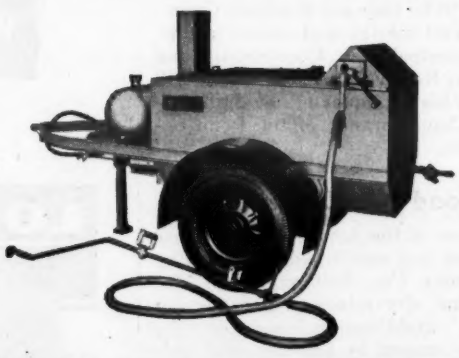
Routine maintenance is quite important. These days it is full of headaches. Take the matter of mowing right-of-ways, for instance. New mowers have been impossible to get, and the old machines are now in such shape that extensive winter repairs make them good for only about four months of mowing in the summer. The one disadvantage of graveled shoulders and a pervious blanket under the pavement

(Concluded on next page)

Holes in black top are as inevitable as winter, and the best and cheapest way is to get on them quickly with the finest repair equipment anywhere available—Littleford. Put Littleford's Trail-O-Roller on patch work and the holes will soon disappear. For this compact little number is motorized and portable, converts from rolling to traveling, or back, in two minutes; trails as fast as you drive a truck; compaction as great as five ton tandem! *There's* efficiency! Combine that with Littleford heating Kettle and 101 Utility Spray Tank, and you're ready for the toughest road job that winter can throw at anybody!



Littleford 101 Utility Spray Tank is combination of three units: Spray bar for spraying, hand spray for patch work, pouring pot outlet for filling cracks.



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Road Maintenance

(*Continued from preceding page*)

seems to be that loose rocks get tangled up in mower blades, much to the detriment of the latter.

In many parts of the state, therefore, motor graders blade the shoulders and roadside ditches in late spring and autumn. This is a weed-control as well as a drainage measure. The graders are currently working even longer stretches of highway than they have in the past, in order to help out on weed control.

The State has solved a bad flood-control problem on some mountain streams by building debris basins ahead of bridges. Boulders and other obstructions deposited in these basins are then cleaned out after storms.

Snow Removal

Snow removal has been one of the big maintenance jobs for years, but is so well organized at present that Maintenance Engineer Ray Gillis considers it no special problem. V-type plows, rotaries, and straight push plows have not worn out, and snow-fighting equipment is still classed as "adequate".

However, Utah has some very tricky snowfalls. A district engineer at Provo tells about a storm one early spring afternoon several years ago, which marooned motorists at a highway junction 25 miles east of town. The weather in Provo was sunny and warm. When the maintenance patrolman called headquarters to get snow-fighting equipment and crews mobilized, everyone at headquarters thought he was kidding.

Snows are removed by getting push plows out as soon as the highway is covered, and keeping the snow moved out to the shoulders. In very bad storms, or late in the season when the pile-up of snow is bad, rotary plows are used to widen the highway and throw the snow off to the side.

The State is doing some roadside development work, but this consists primarily of encouraging native shrubs and grasses to grow on shoulders and backslopes. One of the construction features of new highways is the flattening of slopes to facilitate plant growth, and to prevent destructive erosion.

Thus, by designing new construction for reduced maintenance, and by doing maintenance work to high construction standards when the need for it develops, Utah has settled on a sound highway program. The degree of excellence of its highways, measured in terms of dollars expended, is one of the highest in the west.

Pierce Joins H. O. Penn

The addition of Phillip F. Pierce to its sales force has been announced by the Engine Division of the H. O. Penn Machinery Co., Inc., New York City. Pierce will be engaged in selling Caterpillar diesel marine and industrial engines principally in Connecticut and along the New England coast. He will establish his headquarters at the Newington, Conn., branch of the Penn organization.

Road-Mix Machine

The uses of the Ariens Aggmixer are illustrated in a new broadside issued by The Ariens Co., Brillion, Wis. The implement dry-mixes aggregate for highway stabilization, reduces the moisture content by aeration, and pulverizes and mixes the road material with whatever binder is used. It operates from the power take-off of a tractor.

The folder describes the functions and purpose of the Aggmixer. It covers several descriptions of job applications, on single-sheet broadsides. One side of the page gives job requirements, equipment and materials used, job location, contractor, and other pertinent information. The other side is devoted to a picture story showing the equipment in use, before and after shots, unusual conditions encountered, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 66.

Reid Made Chief Engineer Of Universal Atlas Cement

The appointment of Henry P. Reid as Chief Engineer has been announced by the Universal Atlas Cement Co. of New York City; the firm is a subsidiary of the United States Steel Corp. Mr. Reid, formerly Assistant to the President, has been associated with the company for twenty-three years.

He is Chairman of the General Technical Committee of the Portland Cement Association, and former Chairman of the Manufacturing and Research Committee of the same association. He is also the author of several studies on fuel economy in cement manufacture.

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* $.07 per lb., f. o. b. location in crystals, flakes and 1-lb. blocks; $.08 per lb., f. o. b. location in ½ lb. blocks; packaged in 50-lb. wooden or fibre boxes. Also available #10 & 12 blasting caps (required for TNT) and primacord.

DETAILED SALE INFORMATION

This material is offered, as is, subject to inspection by purchaser at location, without expressed or implied warranty except as to title. WAA reserves the right to reject any or all offers, to make awards in whole or in part, or to extend the period of sale. All items subject to prior withdrawal.

Purchasers of TNT are required to observe all applicable laws regulating the sale, use, handling and storage of explosive materials.

10% has been reserved to fill needs of Federal agencies received by April 30th. All other orders received by this date will be filled in following sequence: (a) Veterans of World War II; (b) All other priorities; and (c) Commercial purchasers. Purchaser's order must state thereon: (a) "This order is subject to WAA Standard Conditions of Sale, and all other advertised terms and conditions, and no other terms and conditions shall be binding on War Assets Administration"; and (b) Type of business and level of trade.

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	6,392,663	20,425,078	177,700	98,443

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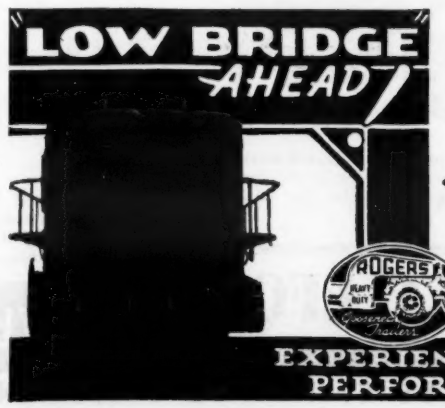

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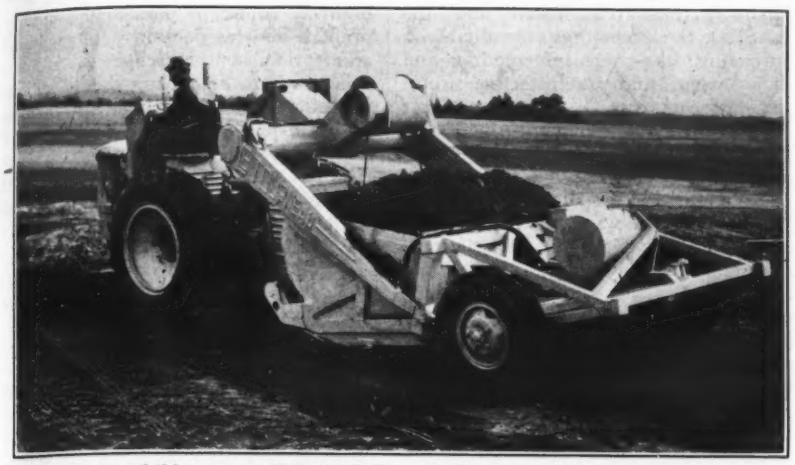

The operator of this new small Model D Tournapull steers, shifts, and handles all E-4 Carryall-scraper controls by buttons on an electric control panel.

Small Scraper Has Electric Controls

A new small Tournapull for high-speed dirt-moving, the Model D, has been developed by R. G. LeTourneau, Inc., Peoria, Ill. The unit adds to the company's line of rubber-tired earth-moving and construction equipment.

Powered by an 85-hp gasoline engine, the prime mover is equipped with the new E-4 Carryall scraper, which has a load limit of 4 tons and a struck capacity of 3.3 yards. The unit is self-loading; it has four speeds forward, four reverse; and it travels up to 23 miles per hour.

One of its features is electric control by individual electric motors. This control replaces tractor steering and gear-shift levers, the manufacturer says; it also eliminates the need of a power-control unit for scraper operation. The operator steers, shifts, and handles all scraper controls by buttons on the electric control panel.

The Model D Tournapull has a new-type differential said to keep both wheels pulling at all times. The design of this differential is such that on slippery going the most power is supplied to the wheel on firmest footing. Neither wheel will spin independently of the other. This factor, along with positive steering, is said to contribute to mobility and ease of operation. Positive steering enables the operator to lock the Tournapull and Carryall into a single unit and keep this unit traveling in a given direction.

The model D is said to be able to turn in 17 feet. Other dimensions are: height, 7 feet 4 inches; wheelbase, 13 feet 2 inches; width of cutting edge, 6 feet; and weight empty, 7½ tons.

The two-wheel prime mover uses a 14.00 x 32 tire with tapered beads. This tire is said to seat itself firmly against the wheel rim at low air pressures; to give ample flotation in soft material; and to enable the unit to travel over paved surfaces without damage. The E-4 scraper uses 9.00 x 16 tires.

The following production figures are reported by the company: with good working conditions, average material, and 60-minute operating efficiency, a self-loading and one-man-operated Model D can move 48 yards an hour on a 200-foot one-way haul; 40 yards on an 800-foot haul; 33 yards on a 1,500-foot haul; 27 yards on a 2,500-foot haul; and 18 yards an hour on a 5,000-foot one-way haul.

The manufacturer recommends the Model D in general construction work for grading, maintenance, and drainage on roads and airports; stripping and working roadside gravel pits; spreading surfacing material; road-widening operations, and similar jobs requiring a small dirt-mover.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

Voshell of PRA Retires

The retirement of James T. Voshell, Division Engineer in charge of the Division Office of the Public Roads Administration, Federal Works Agency, at Chicago, has been announced by that organization. Mr. Voshell concluded 40 years of service when he retired last December 31. He had been with the Public Roads Administration longer than any other employee.

Mr. Voshell was graduated from Purdue University with a B.S. degree in civil engineering, and has served continuously with the Public Roads Administration since his graduation. He reached retirement age in 1944, but kept his post for the duration of the war at the request of Thomas H. MacDonald, Commissioner of Public Roads.

Mr. Voshell's duties have been assumed by R. H. Harrison, who has been appointed Acting Division Engineer.

H. B. Zachry, San Antonio, Texas, is well ahead of schedule in the construction of a 12-mile-long earthen dam for flood control purposes near Addicks, Harris County, Texas. This $2,775,000 job involves moving 7,000,000 yds. of earth.

Gulf Products and Fine Service help contractor keep ahead of schedule on big earthen dam project

"IN spite of bad weather conditions, we're well ahead of schedule on this job—thanks in a large measure to Gulf products and fine service," says Perry Jefferies, Job Superintendent. "Proper lubrication and top-notch fuel performance have enabled us to push equipment to the limit without delays from mechanical troubles."

Working as a team, Gulf quality lubricants and fuels help keep contractor's equipment on the job and operating efficiently day in and day out. Added up, this kind of equipment performance means greater yardage, lower maintenance costs, and a speedier job.

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Roadside-Development Educational Program

Highway Research Board Committee Offers 3-Point Plan for Technicians and Public; Training Needs

+ THE Committee on Education of the Highway Research Board's Roadside Development Division submitted a 3-point program at the annual meeting of the Board in Washington last December. Its purpose is to re-awaken both the technical personnel engaged in this field and the general public to a better understanding of roadside development. The plan emphasizes the motives, methods, and results of an intelligent and organized roadside-development program.

Educating state highway administrative and operating staffs, including landscape architects and engineers, is point one of the plan. Point two lists the steps through which the public may be informed and aroused to greater interest in the subject of roadside development. The third point contains recommendations to be followed so that key positions in the field may be filled with competent and trained men.

Informing the Staff

To instruct and inform technical personnel, adoption of the following steps was suggested:

1. Each state highway department should organize and conduct annual or seasonal conferences within itself. The conferences should include both the top men and those who actually supervise or do the work in the field. This program could be developed to include the G.I. in-service training requirements.

2. For a given area or district of states, a general conference or "short course" should be inaugurated. It should be organized similarly to the Iowa and Ohio conferences and in cooperation with a leading educational institution. Proceedings of these district conferences should be published and given wide dissemination through the press, technical as well as local, and through the present Highway Research Board distribution set-up.

In organizing programs for such conferences, state highway departments and other public agencies are urged to furnish freely to neighboring states talent as requested from their personnel; in this way programs would benefit from a wide field of experience and knowledge. It is recommended that the Senior Landscape Architect of the Public Roads Administration, or an able assistant, attend these conferences insofar as possible, to advance national viewpoints, to indicate PRA interest, and to lend prestige.

3. Regional coordinators' meetings should be re-established by the Coordinating Executive Committee of the Highway Research Board and the AASHO. Such meetings are valuable in spreading like-area information and experiences, and in fostering useful personal contacts.

4. Highway department landscape personnel should be fully aware of the value of state and national conferences (such as those of the Highway Research Board and the AASHO, and those that are called by agronomy associations, seed and weed authorities, the ARBA, and so on). They should exert every effort to attend and participate in them. State highway directors or commissioners should realize fully that such participation is as important for landscape personnel as for the engineering staffs. It would help bring about a more articulated, aggressive, and intelligent approach to the work of the landscape personnel.

5. It is strongly recommended that highway landscape personnel regularly prepare articles dealing with technical and practical landscape operations, specifications, etc. They should submit them for publication to trade magazines, the local press, and radio. Editors and publishers will receive these articles readily. And they will afford a constant source of information and publicity to the engineer, to the contractor, and to the public.

6. The availability and accessibility of sources of information on roadside development are important. A complete and running bibliography should be maintained. In addition, an edited condensation of the most worthy published articles or papers would be of great educational value. It should be mimeographed and distributed to the states, to schools and colleges, and to others who are interested or who may request

(*Continued on next page*)

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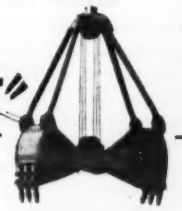

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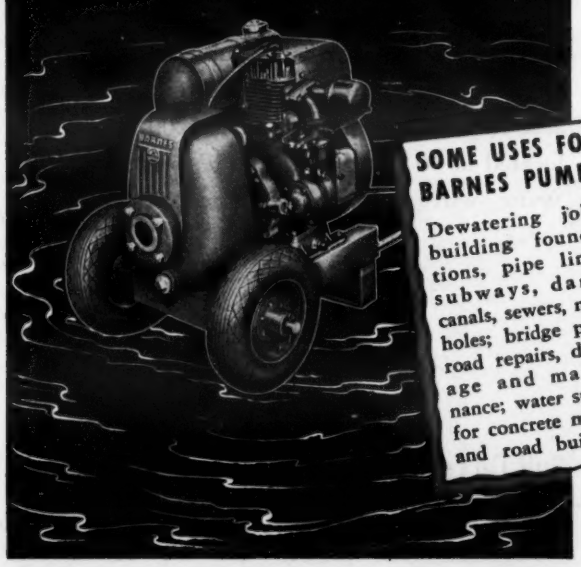

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Roadside-Development Educational Program

(*Continued from preceding page*)

it. Collected, cataloged, and available material such as this would provide study matter for college reading and for G.I. in-service training, and would be a general source for reference reading. Until the task becomes too large and warrants other procedure, the present committee volunteers to do this work, using the Research Board distribution service wherever possible.

7. It is recommended that the Coordinating Executive Committee of the Highway Research Board and the AASHO re-establish regular contests in roadside-development project, design, and execution. It is also recommended that in doing so it give thought to several awards for different phases of the work in any one contest; this procedure should foster wider interest and publicity. Such a contest program will promote better work. It will create renewed zeal among the landscape architects and the engineers, as proved by past experiences.

8. It has been shown that voluntary desire for consistent roadside-development programs within a state will often fail over a period of years; this is due chiefly to changing highway key personnel. It is therefore recommended that for an extended and indefinite period PRA require a minimum percentage of highway funds to be used for roadside-development programs. Or it is recommended that minimum obligations be established to insure a continuing roadside-development program in each state. This procedure might be classed as "compulsory education", proved by experience to be needed.

Telling the Public

For informing the public and stimulating it into action, the Committee offered the following recommendations:

1. State Roadside Councils should be established in cooperation with the National Roadside Council, 119 E. 19th St., New York, N. Y.; or inactive or defunct Roadside Councils should be reorganized. These Councils, where established and active, have been invaluable in creating favorable public opinion towards roadside development through wide-spread individual participation, through the press, and through private and public meetings. They are invaluable in promoting and securing passage of needed or "authority" legislation covering roadside-development programs. They are also of value in "creating a demand for roadside development"—to quote the expressed motto of one State Council—among the highway directors, commissioners, or chief engineers.

2. The value of personal contacts between the highway landscape-architect personnel and the public cannot be overemphasized. This is accomplished by attending and talking before garden clubs, civic organizations, nurserymen's meetings, etc. Exhibits at these meetings and at local, county, and state fairs are excellent and should be fostered.

3. The press is always open to human-interest news stories and photographs, such as roadside-park developments, attendance records, mileage of erosion control, memorial tree plantings, and so on. Every use should be made of this source of publicity.

Technical Education

In order to promote technical-education training so that key positions may be filled with competent and trained men, and so that these positions will be interesting to trained men, the following steps are recommended:

1. The Highway Research Board should authorize the Project Committee on Education to recommend curriculum revisions to civil-engineering colleges, and to colleges giving degrees in landscape architecture. The courses of study for students in civil engineering might well include such subjects as erosion-control practices, an appreciation of landscape design, and some general horticultural practices. For students in landscape architecture the stress should be placed on additional surveying and topographical work, reading of highway plans, and drainage or hydraulics. With these offerings, students so inclined can elect courses of study that will fit them for positions which will have to do with the complete development of the highway.

It is well recognized that all schools are now burdened with work resulting from over-enrollments. However, they are in a period of transition. And the Committee on Education, with the assistance and approval of the full Committee on Roadside Development, offers to prepare a recommended series of courses of study, both required and elective, for submitting to the schools

(*Concluded on next page, Col. 2*)

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This lightweight loading conveyor, the Bosworth Conveyall, can be used to load trucks from stockpiles or to shift materials from one storage spot to another in yards or plants. It is said to handle material as fine as 300-mesh.

Lightweight Loading, Unloading Conveyors

A new model has been added to the line of lightweight conveyors made by the Bosworth Engineering Co., 6723 Denison Ave., Cleveland 2, Ohio. Known as the Conveyall, it is a lightweight type of loading conveyor which may be used for shifting materials to various storage spots in plants or yards, for loading trucks from storage piles, or for any other purpose of loading materials.

The Conveyall is an endless cleated-belt loader which can be operated by one man. It is said to handle anything from 300-mesh material up to large bulky items. The loading chute can be adjusted to variable heights.

The firm also makes the Moto-Trimmer, a self-powered unloading conveyor. It is adapted to handling sand, gravel, small machine parts, concrete, and similar items. Moto-Trimmers are furnished in three models.

Conveyor units built by Bosworth are designed to discharge materials up to 6 feet in height, and capacities of standard models vary from 40 to 75 tons per hour. The source of power for these conveyors is optional, depending upon where they are used and the power available. Special models can be designed in special lengths for unusual loading problems.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 30.

Lincoln Electric Has New Sales Manager and Offices

Recent announcements made by The Lincoln Electric Co. of Cleveland include the appointment of a new sales manager and a new Minnesota dealer, and new locations of offices in San Francisco, Los Angeles, and Birmingham.

The new Sales Manager is W. R. Persons, who has been with the company for several years and is a graduate of its welding school. He also holds an M.S. degree in engineering from the Case Institute of Technology.

The dealer appointed for Duluth, Minn., is Wallner Welding Supply Co. located at 303 So. First Ave., East Duluth. General Manager of the company is L. D. Wallner.

The new location of the San Francisco office and warehouse is at 1302 Stanford Ave., Emeryville 8, Calif. It is under the direction of L. P. Henderson. The Los Angeles office and warehouse is now located at 1500 Calzona St., P. O. Box 7336, Station L, Los Angeles 23, Calif. J. B. McCormick is in charge. The Birmingham district office has its new location at 113 No. Ninth St., Birmingham, Ala., with J. E. Durstine as the District Manager.

Roadside-Development Educational Program

(*Continued from preceding page*)

within the year 1947.

2. So that landscape architects in public positions may feel secure in these positions, the protection of Civil Service is necessary. Therefore, a simple and direct classification, which includes duties and qualifications and covers the essential positions in a state highway department, should be approved. It should be sent to all state highway and Civil Service departments as a working model for setting up administrative and operative organizations.

This outline should be so prepared that other governmental agencies doing roadside-development work could receive and profit by the suggested organization set-up, with possible minor adjustments to be made by them.

In conclusion, the Committee believes that roadside development will make great strides in the immediate future and that steps should be taken to assist laggard or dormant states right now. Much thought has been given to these recommendations in meetings over the past few years. The adoption of the operating suggestions and the prompt dissemination of them is earnestly recommended.

The report of the Project Committee on Education, Division III, Roadside Development, was presented by Professor P. H. Elwood of the Department of Landscape Architecture, Iowa State College. Dallas D. Dupre, Jr., Landscape Architect of the Ohio Department of Highways, is Chairman.

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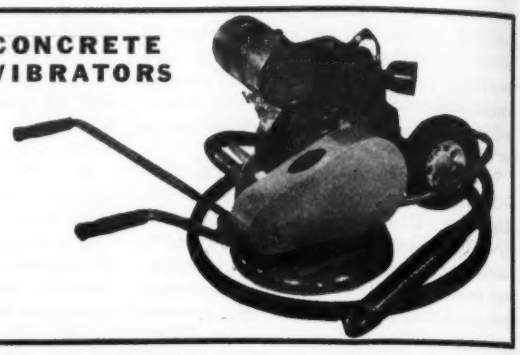

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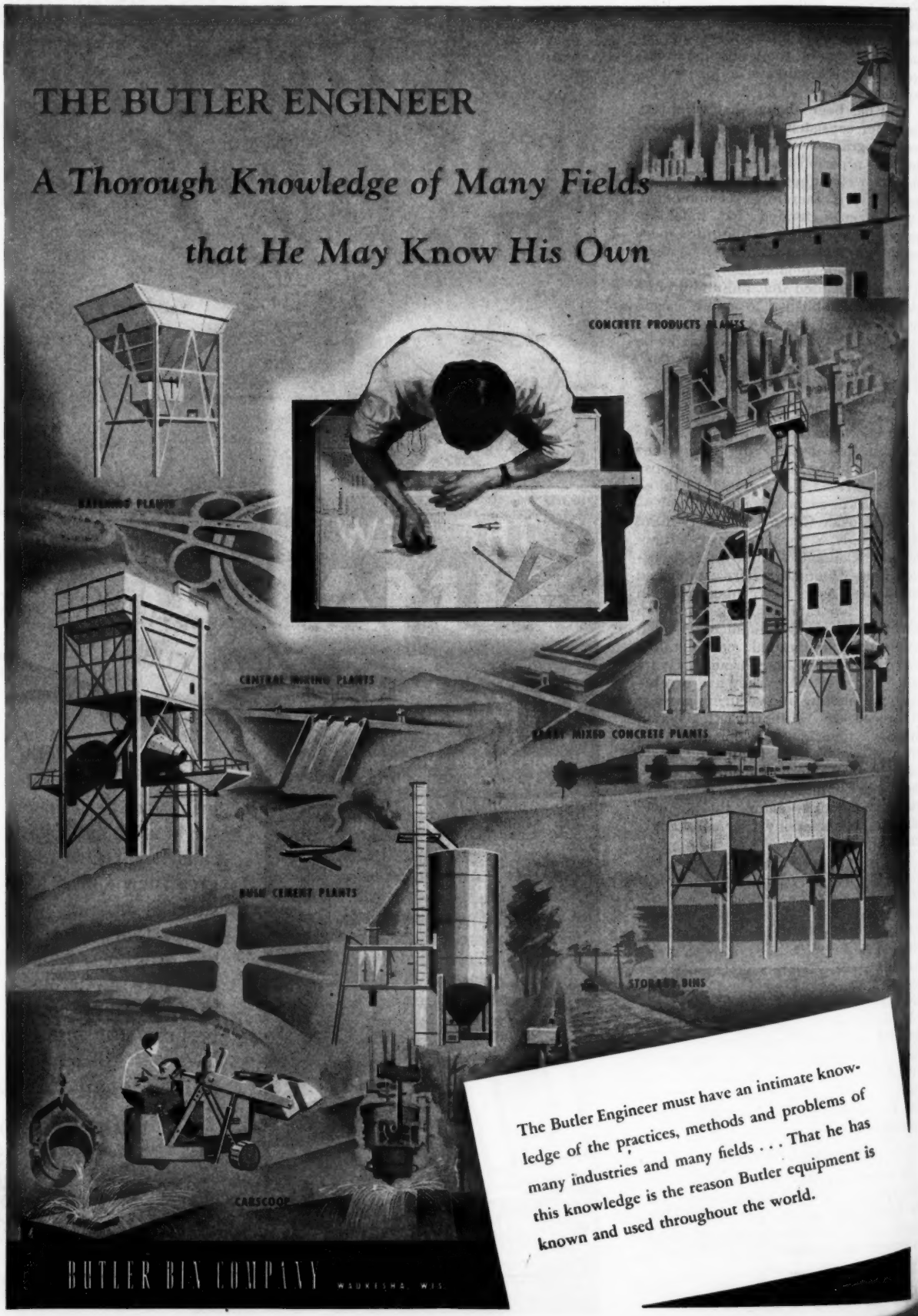


The Butler Engineer must have an intimate knowledge of the practices, methods and problems of many industries and many fields . . . That he has this knowledge is the reason Butler equipment is known and used throughout the world.

BUTLER BIN COMPANY WAUKESHA, WIS.

This Apsco trailer-type trench filler, designed to handle any type of material used for road widening, has a 2 to 8-foot width of spread and a 3-cubic-yard hopper.

Machine Designed For Road Widening

A new machine designed for use in road-widening operations has been announced by the All-Purpose Spreader Co., P. O. Box 105, Fuller Road, Elyria, Ohio. Known as the Apsco trench filler, it is said to be able to handle any type of material used on road-widening jobs, from 1½ inches down to screenings, bituminous mix, sand, gravel, stone, etc. It is made in two self-propelled models, 70 and 60.

All three models are the same general design. Model 70 has an extra-heavy large auger, dual Timken-Detroit axles, and is mounted on 9:00 x 10 pneumatic tires. Width of spread on all three models is from 2 to 6 feet, with an extra attachment which can increase it to 8 feet. Capacity of the hopper is 3 cubic yards, and it can be filled while the machine is in motion.

The controls on the Apsco trench filler are within easy reach of the operator, and there is a full operating view of the road edge, the manufacturer says. The machine has heavy-duty automatic-type steering, plus individual brakes on the rear wheels. The depth of spread is controlled by two adjustable screws attached to a strike-off blade. The width of spread is controlled by two adjustable screws attached to a telescopic hopper. Aggregate is dumped in the hopper; an auger moves it into the widening trench where it is leveled by the strike-off blade, leaving a smooth surface.

It is stated by the manufacturer that the Apsco has a spreading capacity of up to 150 tons per hour, depending upon the weight of the material used.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 31.

One-Pass Soil Stabilizer

Of interest to construction men, and particularly to highway officials and road builders, is a bulletin released by Harnischfeger Corp. of 4400 W. National Ave., Milwaukee 14, Wis. The bulletin describes the new P&H single-pass soil stabilizer.

The manufacturer states that the machine can perform all stabilizing operations in a single pass, such as shaving and pulverizing the in-place material, thorough blending, application of liquids, final mixing, and spreading to a uniform depth.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 97.

Cuts Joint Material

An expansion-joint slitter, which enables contractors to stock slab lots of joint material and cut their own expansion joints to size, is now on the market. It is offered by the Keystone Asphalt Products Co., 43 E. Ohio St., Chicago 11, Ill.

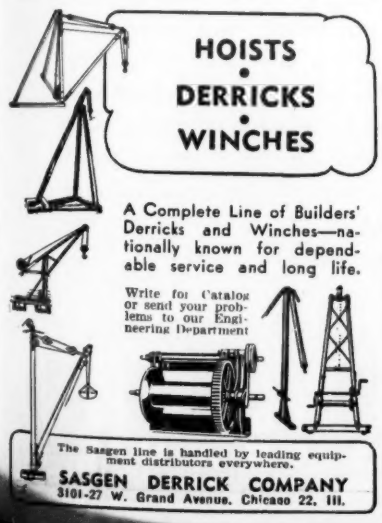
The unit is driven by an electric motor or gasoline engine of 1-hp capacity. It is said to be able to handle materials up to 1½ inches thick at a rate of 60 linear feet per minute. Forward and reverse operation permits cutting in either direction. The cutting width is controlled by a guide bar with rollers, and is adjustable for any width from 3 to 12⅛ inches. There is a safety bar and guide at the cutting center.

As another safety feature, all moving parts are enclosed, except the cutting surface of the knives. The top cutting blade is lubricated to prevent loading.

This Keystone expansion-joint slitter handles materials up to 1½ inches thick. It is driven by a 1-hp electric motor or gasoline engine.

The base of the unit is constructed of a heavy welded supporting framework and a fabricated cabinet with a heavy-top working surface.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 32.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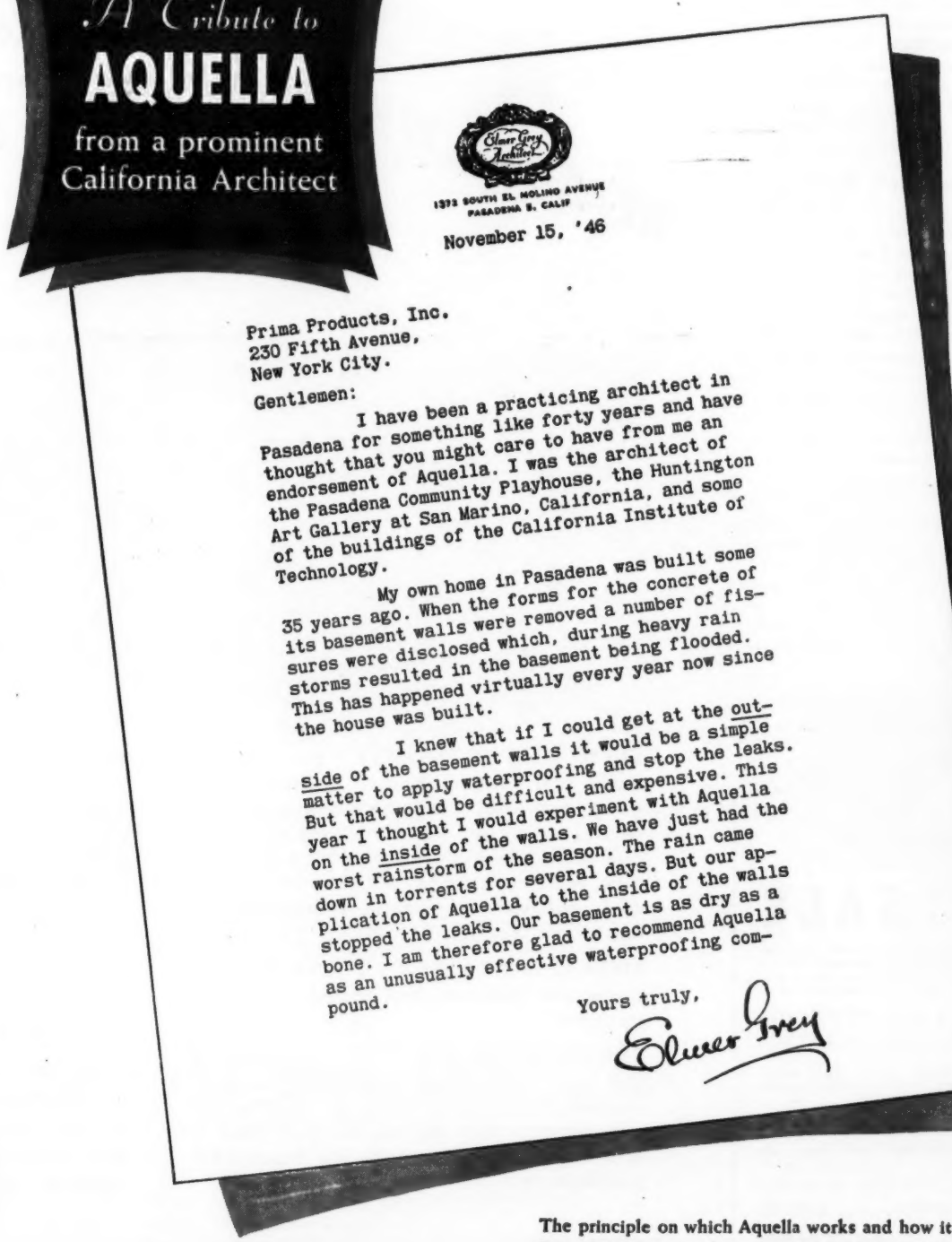
A Tribute to
AQUELLA
from a prominent
California Architect
Elmer Grey Architect
1373 SOUTH EL MOLINO AVENUE
PASADENA 5, CALIF
November 15, '46
Prima Products, Inc.
230 Fifth Avenue,
New York City.
Gentlemen:
I have been a practicing architect in Pasadena for something like forty years and have thought that you might care to have from me an endorsement of Aquella. I was the architect of the Pasadena Community Playhouse, the Huntington Art Gallery at San Marino, California, and some of the buildings of the California Institute of Technology.
My own home in Pasadena was built some 35 years ago. When the forms for the concrete of its basement walls were removed a number of fissures were disclosed which, during heavy rain storms resulted in the basement being flooded. This has happened virtually every year now since the house was built.
I knew that if I could get at the outside of the basement walls it would be a simple matter to apply waterproofing and stop the leaks. But that would be difficult and expensive. This year I thought I would experiment with Aquella on the inside of the walls. We have just had the worst rainstorm of the season. The rain came down in torrents for several days. But our application of Aquella to the inside of the walls stopped the leaks. Our basement is as dry as a bone. I am therefore glad to recommend Aquella as an unusually effective waterproofing compound.
Yours truly,
Elmer Grey

The principle on which Aquella works and how it is being used by architects, engineers and contractors to control water seepage on all porous masonry surfaces is told in our new brochure "Aquella and Concrete Masonry Construction." May we send you a copy?

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Pile Driver Sinks Pier Foundations

Round Steel Sheet Pile Cells Driven to Refusal And Filled to Top With Concrete on Bridge Job

✦ IN an unusual application of the driven circular steel cell, L. G. Barcus & Sons of Kansas City, Kans., recently finished the steel and concrete substructure for a new $118,000 highway bridge on U. S. 40 and U. S. 24. The 4-span structure will carry two lanes of automobile traffic across the Vermilion River and Rock Creek floodway 40 miles west of Topeka. It was built under a contract with the State Highway Commission of Kansas.

The bridge design included two 100-foot and two 120-foot solid spans of structural steel to form a 100-120-120-100-foot continuous deck girder. These spans were set on stub abutments with piling driven 56 feet deep, and on three center dumbbell piers with piling driven to 34 feet of penetration. All pier and abutment sites were core-bored by geologists of the State Highway Commission before the bids were taken. Core-boring for bridge piers, to determine how far down the foundations have to go to obtain stable footing, is now standard practice in the state.

Work Starts Despite Shortages

When the job was let in January, 1946, the manufacturing picture on steel sheeting and structural members looked gloomy. So Barcus & Sons paid a premium price to get the steel sheet piles for the piers from warehouse stock in Kansas City, Mo. This item cost them about $800 more than mill delivery at the outset. But it permitted them to get started driving the piers well in advance of the estimated flood season from April to June. Standard M-112 steel sections were ordered.

Patterns, or jigs, were laminated from three thicknesses of 1-inch boards, and made to fit snug inside the pier forms. These jigs were set in place and checked for location by the state survey party. They were also carefully staked down to prevent their moving.

A Northwest crane with a 60-foot boom was used to set and drive piles.

C. & E. M. Photo

This shot of the Barcus bridge job was taken from the top of the right stub abutment. It shows the three center piers in place and the left abutment poured to the bridge seat. Steel sheet piles were used to make the bulkhead at the far abutment.

The first pile of a pier was set perfectly plumb both ways, and checked to no tolerance on a standard carpenter's level. It was then driven to a penetration of about 15 feet through the river sand by a 75-hp horizontal locomotive steam boiler and a McKiernan-Terry No. 7 double-acting hammer.

Subsequent pile sections were then alternated on either side of this guide pile, and driven to about 10 feet of penetration. The lower 6 inches of the male web of each pile section was burned off by a welder before the pieces were picked up. This permitted enough of the pile to hang below the joint, at the time it was set, to press against the pile wall easily and make the interlock. Two pieces of 2 x 4-inch timber, bolted to the piling which was being set and near the loftman's stirrups, assisted him in making this operation simple.

If the circular cell proved too large for the jig, a steel cable was passed around its base and hooked to a ratchet. When the last section was ready to be set in place, some tension was put on the ratchet to pull the piles in very slightly. The first pier checked out fairly close, but far enough off to cause a ¼-inch correction to be made in the diameter of the jig for the next pier. The two other piers checked within ½ inch, almost close enough so that

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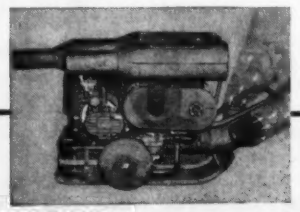

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MICHIGAN

POWER SHOVEL COMPANY

BENTON HARBOR, MICHIGAN

Driving Pier Piles

(Continued from preceding page)

the ratchet or spreading jacks did not have to be used for the last pile section.

The steel sheeting was driven to refusal—or very nearly so—in a hard shale stratum 34 feet underneath the bed of the river. Pile lengths were ordered on the basis of geologists' core borings, and they all checked within 2 feet. The abutment piles were 18 feet longer than pier piles, but all piles were driven to the same stratum. The difference in length was due to the design of column piers and stub abutments. In any case solid bearing was found where the geologists had predicted.

Vertical bar stiffeners, which were ordered spot-welded to steel plates on the pile cell walls, were fabricated outside the cells and set in place by the Northwest crane. This suggestion, saving the contractor time and money, was made by Resident Engineer George S. Davis.

Shortages Interrupt Work

The three piers were finished between February 2 and April 18, ahead of the flood season. The delivery of longer sheet piles for the bridge abutments was then delayed, proving how wise Barcus' original judgement had been when he ordered the stock lengths.

Non-delivery of steel piles shut the job down until May 27. Floods which had been expected by that time failed to materialize, so the contractor began hammering the 56-foot sheeting in place on both abutments. A semicircular protective bulkhead to deflect floods away from the abutment foundations was also driven; as its radius point, the center line of the bridge on the abutment axes was used. Both abutments were finished by August 6, and a Jaeger ½-yard concrete mixer was used to fill the upper 4 feet full of Class A concrete. This work had gone ahead on the piers earlier. The bulkheads were filled with borrow-pit sand from a near-by highway job.

Late in August, the bridge was again tied up, this time for lack of the structural steel to finish out the contract. However, the contractor had reports at that time that the steel was being fabricated in Kansas City, Mo., and would soon be sent out to the job. In any event, his handling of the project with a very realistic attitude towards the shortage of steel had put him in such shape that no high water could then harm him.

Personnel

Monroe Barcus was the Superintendent, and Geo. S. Davis was the Resident Engineer for the Kansas State Highway Commission. R. C. Keeling is State Highway Engineer, with George E. Tiffany as Engineer of Construction.

How to Select Magnetos

The important subject of how to select magnetos is the theme of a new catalog issued by the Wico Electric Co., West Springfield, Mass. Bulletin S-164 describes some of the factors to consider, such as (1) the type of magneto, flywheel or rotary; (2) types of mounts, base, flange, or distributor; and (3) the output required to operate your engine under various conditions.

This 28-page bulletin describes eight models in the Wico line, through the use of text for general specifications and drawings for exact construction details. A two-page spread is devoted to the theory of magneto ignition and the flow of electrons through a magneto.

The company also has available for the asking a loose-leaf folder which gives brief instructions and parts lists for the care and operation of magnetos. Included with this folder is a complete list of dealers and authorized service representatives.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 91.

Years mean little to a GM Diesel

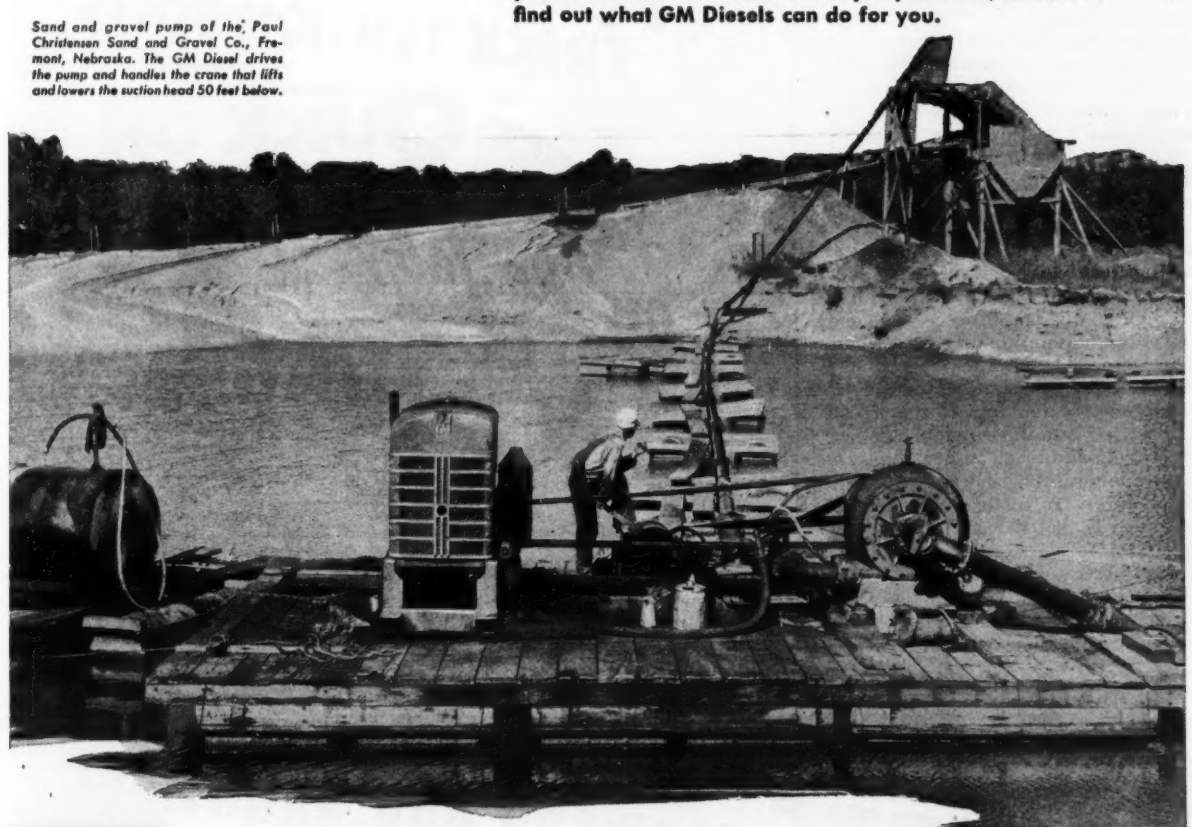
Here's old No. 167, an engine made years ago. For the first part of its life, it powered a truck. Since 1941, it has been mounted on a barge, working at another tough job.

Belted to a 6" centrifugal pump, No. 167 is sucking up tons of sand and water from a depth of 50 feet and tossing it high into a sand hopper on the beach.

It's a good example of how these General Motors Diesels, with power at every downstroke, stand up and take any job in their stride. Any owner will tell you about their economy both in fuel and maintenance—their ease of starting, and their quick pick-up under load.

All kinds of construction work can use efficient, portable power like this. So whatever the job you have, be sure to find out what GM Diesels can do for you.

Sand and gravel pump of the Paul Christensen Sand and Gravel Co., Fremont, Nebraska. The GM Diesel drives the pump and handles the crane that lifts and lowers the suction head 50 feet below.



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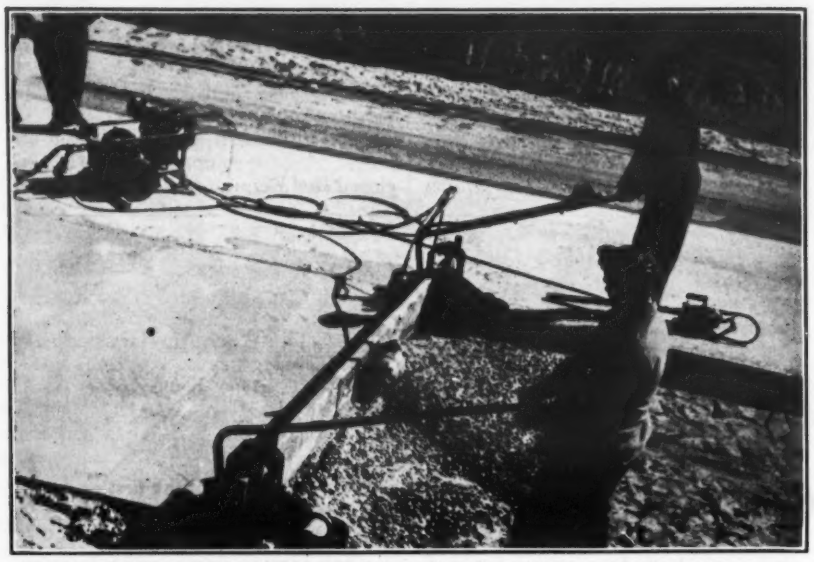
FROM 1940 to 1946 the American Red Cross spent, at home and abroad, more than $700,000,000 . . . During that period 1,169,500 persons were aided in 1,152 disasters . . . 14,142,096 were assisted in military camps and hospitals in this country, and 12,304,293 servicemen and their families were helped through Red Cross chapters . . . 10,371,359 certificates were issued in first aid, water safety, and accident prevention and 1,636,190 in home nursing. All these activities were possible through your support of the Red Cross!



The new Jackson vibratory hand screed, in conjunction with the new gas-electric power unit, was used on this concrete highway patching job. In the background is the new Jackson concrete vibrator.

New Screed, Vibrator, Portable Power Unit

Three new models of equipment for use in laying and finishing concrete have been announced by the Electric Tamper & Equipment Co., Ludington, Mich., maker of the Jackson line of concrete equipment.

The new Model SC-200A Jackson vibratory hand screed, used in conjunction with the new Model M-1 Jackson portable gas-electric power unit, has been designed for use on a variety of concrete slab-surfacing operations. These include bridge decks, sidewalks, ramps, floors, and odd or short sections of pavement, where it would not be practicable to use a large mechanical finishing machine. The screed member itself is made of wood, which reduces the weight and is said to serve as a good transmitter of vibratory energy.

The screed acts as a mechanical strike-off. The vibrations imparted by the vibratory motor through the screed members and into the concrete compact the concrete and bring to the surface a high-grade finishing mortar, says the manufacturer. A feature claimed for this screed is that it has a tendency to propel itself forward, reducing the pulling effort required. Depending upon width, the screed is operated by either two men or a single individual. When used in conjunction with a Jackson portable power unit, a wide range of vibratory frequencies are said to be available for more readily and uniformly placing concrete.

The Model M-1 power unit has a 4-hp single-cylinder Wisconsin engine, belt-connected to a permanent-magnet-type generator. This type of generator eliminates all brushes, commutation, collector rings, and rotating windings. It is claimed that the only maintenance it requires is rotor-bearing lubrication.

The third piece of new equipment is the Model FS-7A Jackson electric-motor-driven flexible-shaft concrete vibrator. This unit is designed for use where joints and edges must be consolidated. It is powered by a 1¼-hp electric motor capable of producing vibratory frequencies of between 6,500 and 9,000 rpm when submerged in concrete. This varies somewhat depending upon the size of the vibratory head, length of the shaft, and consistency of the concrete.

Heads available for this unit are, in the 10-inch length, 1¾ or 2-inch diameter; in the 18½-inch length, 1¾ or 2⅜-inch diameter. Flexible shafts are available in lengths of 2, 3, 7, or 14 feet.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.

Lima Staff Changes

The Shovel & Crane Division of Lima Locomotive Works, Inc., Lima, Ohio, has promoted J. W. Artz from Manager to Director of Parts Sales and Service. Howard W. Read, formerly the Assistant Parts Sales and Service Manager, has been appointed Parts Sales Manager, with William D. Lutes as Assistant.

T. A. Griffin, formerly Service Engineer for Lima, has been appointed Service Manager of the Shovel & Crane Division.

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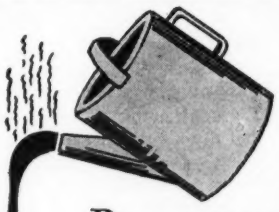

PARA-PLASTIC is the ORIGINAL hot-poured rubber seal for concrete expansion joints.

PARA-PLASTIC remains flexible all year 'round. Its elasticity is permanent in any temperature without breaking its bond with concrete.

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Public Works Are A Continuous Need

Highway Building Cannot Be Considered Merely a Relief Measure if Public Good Is to Be Served

By THOMAS H. MacDONALD, Commissioner of Public Roads

♦ THERE are four main resources whose availability controls any construction program: labor, management, equipment, and materials. However, the need for a continuous public-works program—whether flood control, public schools, or highways—must be considered in terms of its service to the community, rather than in terms of any single factor. There can be, of course, acceleration or deceleration of the program, depending on these resources. But a going program must be maintained.

In little more than a decade, the United States has passed through several extremes in public-works undertakings. The first of these was the result of the depression. Then public works were undertaken on a scale virtually unlimited by financial considerations, as a relief measure to absorb the large amount of unemployment. A second period was entered during the war years, when public works were limited by labor and material shortages to those immediately serving the war effort.

We are now in a third period where availability of resources is still drastically limiting production, and where first needs have had to be carefully assessed. For example, with the close of the war, housing was rightfully accorded priority, and highway officials have been faced with no criticism resulting from interference with the housing program. On the contrary, much assistance has been rendered this program by the extension of access roads to facilitate the production of buildings and building materials.

Duty of Highway Officials

But it is important at this time, during this necessary lag in highway construction, that the public at large and the legislative branches of State and Federal governments be informed of the urgency of adopting a sound highway improvement plan. It is the responsibility of highway officials to inform them also of the problems currently confronting the present-day highway plant.

They must be shown that the traditional concept of highway improvements as public works that may be undertaken or deferred is fallacious in the extreme. Highway plants, among other government-supplied services, require certain continuing construction and maintenance that cannot be turned on or off according to some theory of using such works to fill the gaps if private employment lags.

The public and the legislators must realize that highways are not merely public works as such. They are a service, part of the everyday life of a community, and are necessary to its health, safety, and welfare. The only sound approach means accepting the principle that to avoid irreplaceable losses, the highway plant must be continuously renewed and replaced.

Adjusted to current values, our highway plant reasonably represents a $30,000,000,000 asset. In 1945, there were 1,430,000 miles of surfaced rural highways and 220,000 miles of surfaced urban streets. This investment cannot be protected merely by maintenance alone. Replacement and modernization are necessary to keep up with the ever-increasing traffic needs, and to keep maintenance costs from becoming prohibitive.

Depreciating Highway Plant

The trend in highway traffic has been one of constant increase. By contrast, highway expenditures have been declining for a considerable period. This declining expenditure has resulted in the accumulation of a backlog of several billion dollars in deferred construction expenditures, needed (1) to replace the obsolescent condition of our main state highways, (2) to provide facilities for relief of traffic and parking congestion in cities, and (3) to make needed improvements on our principal secondary roads.

Unless a given segment of road is resurfaced or reconstructed when it needs to be, it becomes not only an obstacle and a hazard to traffic, but a financial liability. For maintenance costs become excessive, and the cost of reconstruction, when the job is finally undertaken, is likely to be unduly high because of

(*Concluded on next page, Col. 4*)

Stinson SR-9 E. NC-48950. New cover. Radio compass-loop. Two receivers and transmitter. New interior and insulated. Hamilton constant speed. Six-hour cruise. Landing and flares. $8000, seller interested in heavier craft.

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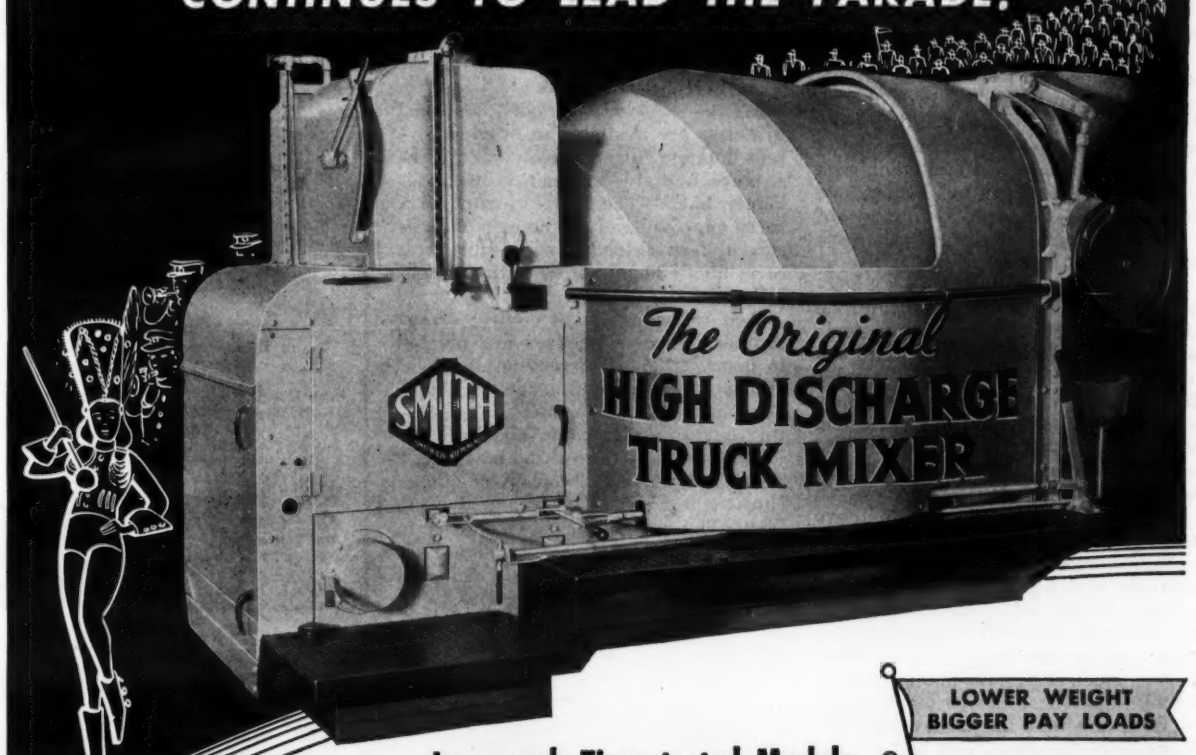

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These improved models retain the well-known Smith-Mobile advantages of High Discharge . . . Feed Chute Charging . . . Visible Mixing, etc. They have larger drums with increased capacities, plus a long list of refinements that make for even greater speed, efficiency and safety in operation.

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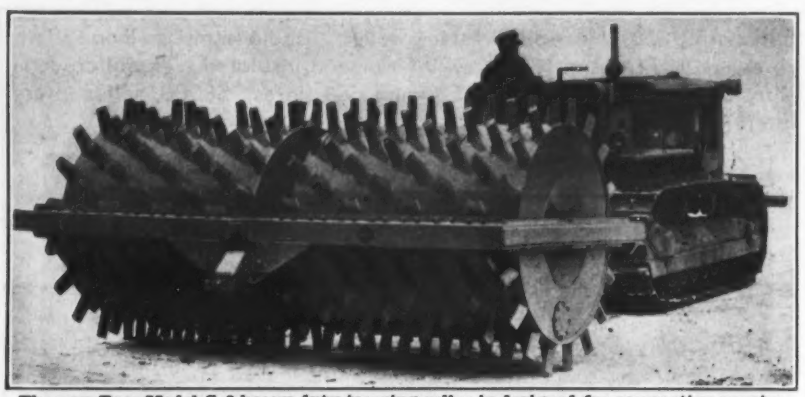

The new Bros Model G-2 heavy-duty tamping roller is designed for compaction requirements of earth dams, airport runways, and highways. The drums are 76 inches in diameter with tapered diamond-shaped feet.

Large Tamping Roller Has Variety of Uses

A large earth tamper that produces compactions of more than 800 psi is a new addition to the construction equipment manufactured by the Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn.

To meet a wide range of compaction requirements, this new tamping roller applies 335 psi when empty, and can be used at any weight up to the 800-pound maximum. The drums when empty weigh 2,350 pounds, 4,000 pounds when filled with water, and 5,660 pounds when filled with wet sand.

The new Bros tamper, tagged Model G-2, has been designed to meet compaction requirements of such varied jobs as earth dams, airport runways, and highways. It uses an oscillating-type roller consisting of two 76-inch drums, designed around a full-floating pole. This full-floating principle allows for full individual drum oscillation with either angular or parallel lifting; one drum may float upward or downward 4 inches independently of the other one with both on a parallel plane.

The drums are surrounded by a box-type frame, centered on the drum axle to prevent off-center loads; but the pole is so mounted on each as to produce a straight-line pull with the tractor drawbar. Each roller has a stationary welded axle, supported on each end with self-aligning ball bearings, dust and dirt-sealed and pressure-lubricated.

The diamond tapered feet which are used give easy penetration with the least disturbance to surrounding material and with lightest draft when leaving the compacted area, according to the manufacturer. The drum-cleaner teeth are constructed of heavy-duty channel steel, reinforced and adjustable for take-up. These cleaner teeth, working off a tangential line from the outside diameter of the drum, can be adjusted for wear.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 36.

Le Roi Co. Purchases Cleveland Rock Drill

As another step in its program to speed up production of rock drills, the Le Roi Co. of Milwaukee has purchased the Cleveland Rock Drill Co., Cleveland, Ohio, a division of the Cleveland Pneumatic Tool Co. Included in the purchase were the manufacturing rights to all of the line of rock drills, the jigs, dies, fixtures, patterns, etc., as well as the complete inventory of parts for their manufacture.

The Le Roi-Cleveland line in current production comprises a complete series of rock drills, including light, medium, and heavy hand-held machines, both hand and power-feed drifters, two types of stopers, and a universal wagon drill. A wide range of paving-breaker models, as well as two types of spaders and a backfill tamper and related accessories complete the present line.

Manufacture of Le Roi-Cleveland products has been transferred to Le Roi's Cleveland Division at 12500 Berea Road, Cleveland 11. Russ Morgan, formerly Secretary and Sales Manager of the Cleveland Rock Drill Co. has been elected Vice President of Le Roi and will head the expanded facilities.

New Line of Scrapers; Sizes Match Tractors

Specifications and production features of the new Caterpillar scrapers have been made public in an announcement by the Caterpillar Tractor Co., Peoria 8, Ill. The scrapers are matched in capacity to the power of the Caterpillar diesel tractors. They come in three sizes: 8, 11, and 18 cubic yards, Models 60, 70, and 80 respectively. They are for use with the D6, D7, and D8.

On the two larger models, optional tire sizes are available to provide correct flotation, maintain low rolling resistance, and give longer tire life under bigger loads. The high-pressure tires carry approximately 40 pounds of pressure under full load; low-pressure tires carry about 30 pounds, with the scraper fully loaded.

Two cables maintain control of the scraper. Lead-in sheaves are pivoted to insure straight-in reeving. Sheaves and cables are located inside the gooseneck and side-arm structures. The cutting edge is designed to maintain live loading to every part of the bowl.

The bottom of the bowl is of double construction with steel honeycomb filler. The tail-gate profile conforms to that of the bowl for clean ejection of all types of materials. Depth of cut is said to be accurately controlled. The apron is adjustable to any desired width of opening by varying the length of the lift cable, and the height of blade is easily regulated for any depth of spread, the manufacturer says.

Widths of the cutting edges are 9, 8, and 7 feet. All models have stub axles and tapered roller wheel bearings. Shipping weights are approximately 25,000, 17,500, and 12,300 pounds respectively.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 37.

Snap-on Adds N.C. Branch And Opens Export Division

The opening of a branch office in Charlotte, N. C., has been announced by Snap-on Tools Corp. of Kenosha, Wis. The office, its thirty-ninth, is located at 210 So. Poplar St. George Weitz, formerly with the Jacksonville, Fla., office, will manage this distribution center.

Snap-on is also establishing an International Division to handle its export sales. The export functions formerly carried on in its New York City office will hereafter be carried on from the general offices at Kenosha, Wis. Manager of the newly created division is D. C. Beaulieu.

Public Works Needed

(*Continued from preceding page*)

loss of salvage value.

Thus the very existence of the continually depreciating highway plant imposes on highway administrators and engineers the necessity to plan for a continuous, rather than a sporadic, program of construction and maintenance.

According to a recent inspection of Federal-Aid highways, 27,218 miles out of 187,557 miles are in a condition requiring reconstruction. If this percentage, 14.5, holds on other highways maintained by state highway departments, there are at least 65,000 miles of roads in need of reconstruction.

Maintenance costs have increased to an estimated $750,000,000 a year. Unless proper steps are taken, this amount will continue to rise, while failing to keep highways in a condition to meet the public's demands. For it is utterly impossible to enable present-day highways to meet the burden of added traffic merely by a system of patching and widening. Increased thought must be given to new expressways designed to handle more traffic, with greater safety, at a higher average rate of speed.

From a report submitted to the 32nd Annual Meeting of the American Association of State Highway Officials, in Los Angeles, Calif.

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with **PLASTIC ROCK!**

Plastic Rock comes complete, packed in barrels. Nothing more to buy. No application "formula" to confuse. Simply mix and trowel right over old floor; average depth one-half inch. Old floor Saturday is a new floor Monday. Plastic Rock is absolutely spark-proof, skid-safe even when wet, dustless, silent. Feels like cork under foot. Cannot splinter, crack, crumble, curl or loosen. Also patches concrete to a perfect feather edge. Heavy loads on steel wheels actually improve it. Five-year-old floors show no wear. Used by largest railroads and industries in America. . . . Over 600 contractors have found Plastic Rock a wonderful good-will builder and profit source. No special equipment needed.

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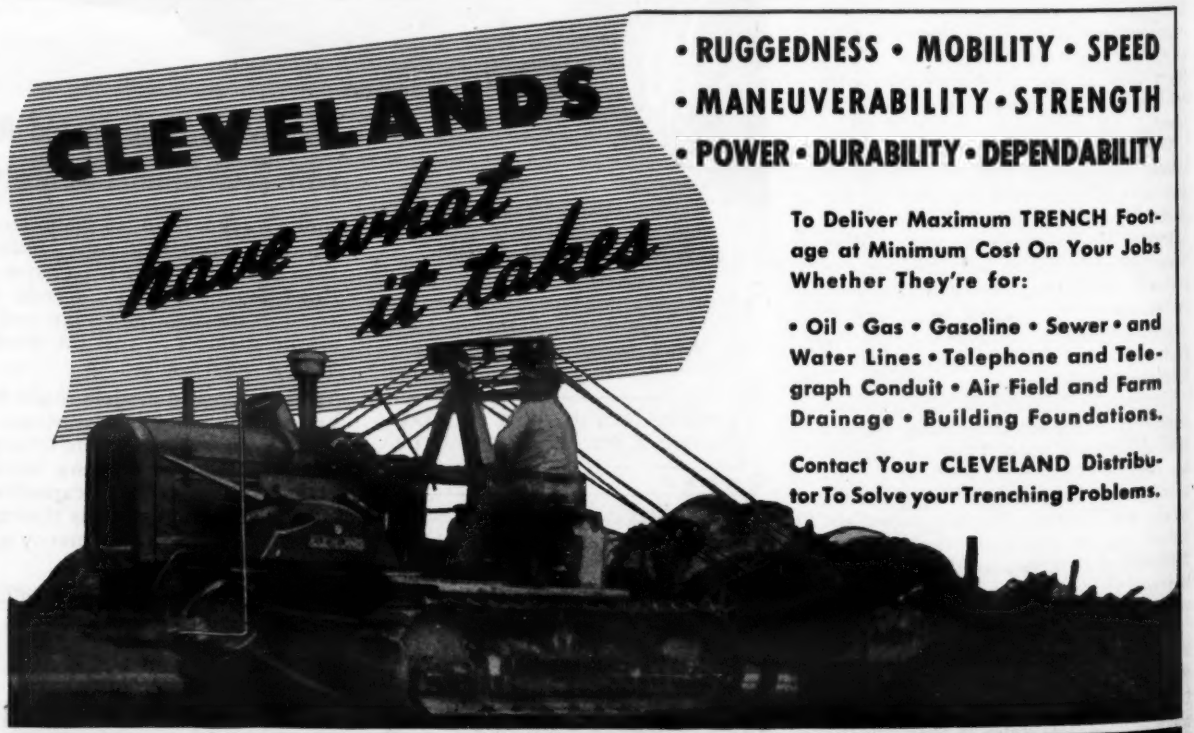

• RUGGEDNESS • MOBILITY • SPEED
• MANEUVERABILITY • STRENGTH
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To Deliver Maximum TRENCH Footage at Minimum Cost On Your Jobs Whether They're for:

• Oil • Gas • Gasoline • Sewer • and Water Lines • Telephone and Telegraph Conduit • Air Field and Farm Drainage • Building Foundations.

Contact Your CLEVELAND Distributor To Solve your Trenching Problems.

THE CLEVELAND TRENCHER CO.
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

This Conveyco completely portable automatic batcher and cement silo were used on a freeway construction job on U.S. No. 99 in California.

A Portable Batcher And Silo Speed Job

Construction of a new freeway to relocate U.S. 99 between Colton and Ontario in California is proceeding ahead of schedule. Credit for this is given to the use of modern mechanized equipment by the contractor, the Griffith Co.

Among the equipment used are a Conveyco 160-ton-capacity automatic batcher and 450-barrel-capacity cement silo. This portable team is said to have batched an average of 665 cubic yards of four-aggregate concrete per 8-hour day, with 929 yards on the peak day. Accuracy within 10 pounds is claimed on 3,000-pound batches, while working at top speed. The silo, which operates on a circulating system, keeps the cement weigh hopper full for instantaneous batching at all times.

It is said that both batcher and silo can be moved to the job and placed in service in less than half a day. This portable feature makes it possible to establish the batch plant near construction sites, thereby shortening truck travel and reducing the number of trucks needed to maintain a steady flow of concrete. The Conveyco units are made by the Conveyor Co., Inc., 3260 E. Slauson Ave., Los Angeles.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 38.

Technical Information On Tire Care and Service

Technical information on the servicing and care of tires for trucks, wheel tractors, carts, and similar uses is contained in three books issued by the United States Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y. Catalog T-45-35 is a sales and data manual on truck and bus tires, Catalog T-45-39 contains technical sales and service information on the U. S. Royal line of industrial tires, and T-45-34 covers off-the-road tires.

The various truck tires manufactured are all illustrated in the first catalog. Other pertinent information is included, such as sizes, plies, rim sizes, widths, etc. The booklet describes the value of recapping, and explains when it is economical to use this method of extending the life of tires. Information is given on the selection of the right tires, on Eger valves, determination of loads and weights, and the importance of matching dual tires.

The industrial-tire booklet describes the essential features and specifications of the various tires in the line, with special emphasis on the U. S. Innacush and the IndUStro. It explains how to replace offset hub wheels with standard IndUStro wheels, and how to obtain replacements for worn-out tires. Other tires described in the catalog include wheelbarrow tires, and casters for pneumatic tires.

Similar information on earth-mover, road-scraper and other types of tires used on contractors' equipment is given in the third manual.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 94.

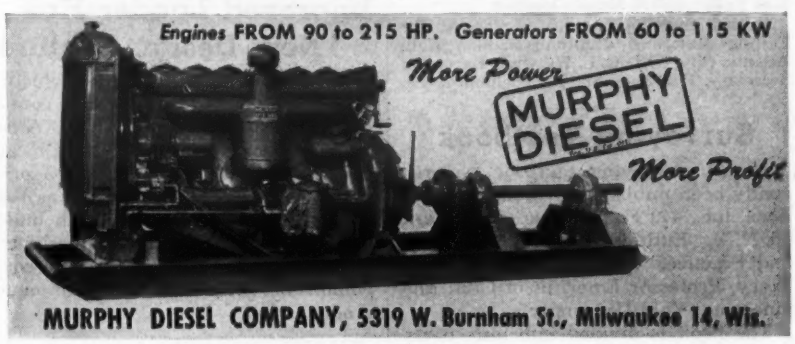
Airport Program Will Exceed $71,000,000

According to a report from the Airport Division of the American Road Builders' Association, the Civil Aeronautics Administration has announced that the 1947 Federal-Aid airport program will call for construction or improvement of 800 airports. It is estimated that the cost of this program will exceed $71,000,000; about $34,000,000 is to be provided by Federal-Aid funds, and more than $37,000,000 is to be provided by the sponsors.

Because of certain limitations in the Federal-Aid airport law, there will be no construction on Class IV or larger airports. The CAA has announced, though, that a larger portion of the 1948 fund will be spent for these airports, in order to keep the program in balance.

The estimated costs are broken down as follows: $55,965,448 for ordinary construction, $5,087,800 for buildings, and $10,538,617 for land. This will leave a balance of about $8,850,000 of this year's funds, even after deducting administrative and other expenses. This amount will be used for further allocation and to meet contingencies. It is expected that appropriations for ensuing years will be higher, possibly $100,000,000, yearly.

Formerly handled by the Commerce Committees in the Senate and House, Federal legislative matters pertaining to airports will now be handled by the Committees on Interstate and Foreign Commerce.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More Power
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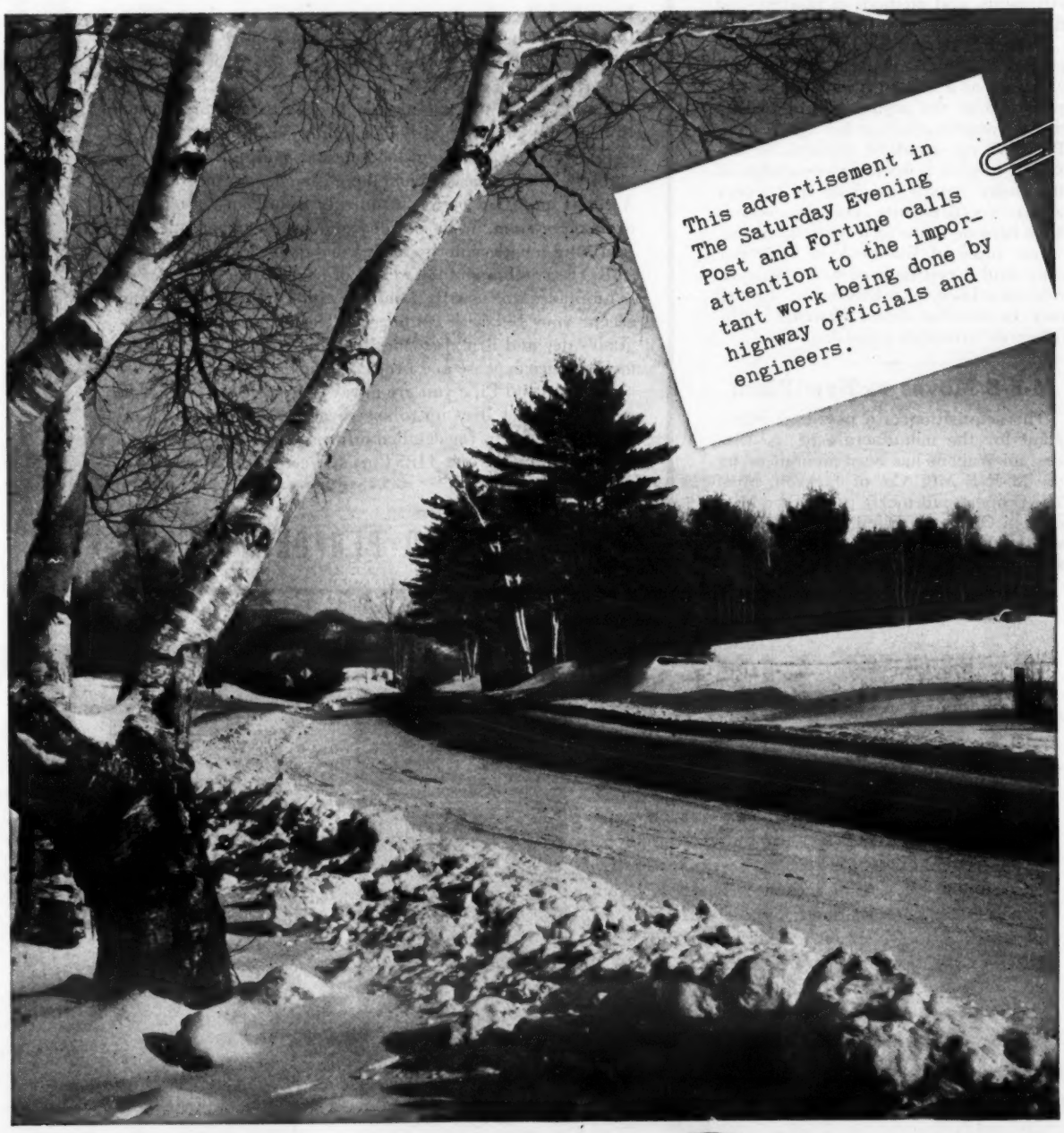
More Profit
MURPHY DIESEL COMPANY, 5319 W. Burnham St., Milwaukee 14, Wis.

COUNTRY ROADS...America has some 2½ million miles of rural roads. They are the heart of our highway system, linking the farmer to his market. For paving such roads serviceably and economically, highway officials and engineers have long relied on a Barrett basic product, Tarvia* road tar.



ONE OF AMERICA'S GREAT BASIC BUSINESSES
Paving Materials . . . Building Materials . . . Wood Preservatives
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THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N.Y.

*TRADE MARK REG. U. S. PAT. OFF.

REMINDER TO ROAD MEN: Now is the time to check the condition of all the roads in your territory. If any have been damaged by winter frosts and snows, investigate the economy of putting them back in first-class shape with the help of Tarvia* road tar. Ask the Barrett field man.

Convention Calendar

March 25-28—N. Y. Safety Convention
Annual convention and exposition, Greater New York Safety Council, Hotel Pennsylvania, New York City. W. F. Brown, General Chairman of the Executive Committee, 60 E. 42nd St., New York City 17.

June 16-20—ASTM Annual Meeting
Annual meeting, American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

Surveying Textbook

A new surveying textbook has recently been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Entitled "Surveying: Theory and Practice," it was written by J. C. Tracy, Professor Emeritus of Civil Engineering, Yale University.

The book is divided into four parts. Part I covers procedures in various types of field work, errors in measurements, and the theory of surveying supplemented by practical suggestions and applications. Part II covers methods of calculation and graphic methods used in office work, the use of drawing instruments, and methods of plotting and finishing maps.

Part III, on surveying instruments, studies their various parts and each instrument as a whole; it includes an explanation of the adjustment of instruments, and directions for their care. Part IV, on standard surveys, is designed to give a working knowledge of the many details involved in surveys where requirements and procedures have become more or less standardized.

List price of the book is $7.50 per copy, and it can be used as a textbook, reference book, or a handbook. Copies may be secured direct from the publisher, or from this magazine.

M-R-S Moves to New Plant

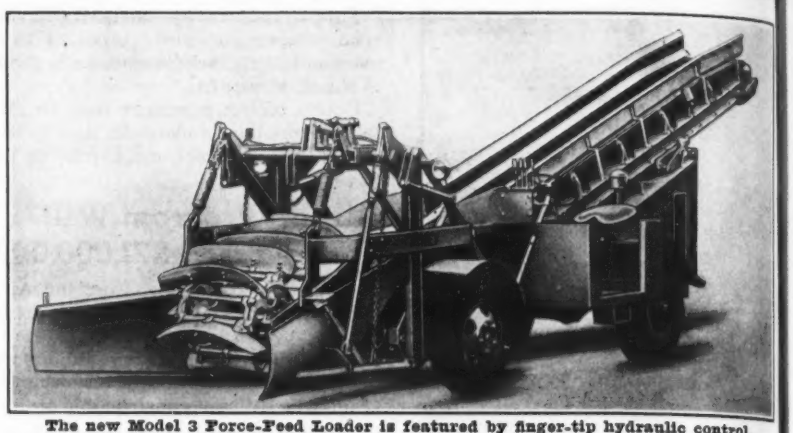
The acquisition of a new and larger plant for the manufacture of its Mississippi Wagons has been announced by the M-R-S Mfg. Co. of Jackson, Miss. The property, formerly part of the Mississippi Ordnance Plant at Flora, Miss., was sold to the company by the RFC, after its receipt from the WAA.

It consists of 406 acres of land and eight buildings with a total of 79,000 square feet of floor space, including a modern plant structure and an office building. It is situated 23 miles north of Jackson, Miss., on U. S. 49.

The company has moved into the Flora plant where it will continue the production of its bottom-dump hauling units which consist of four-wheel trailers powered by diesel wheel tractors.

Improved Loader Has New Design Features

A new Force-Feed Loader which is featured by finger-tip hydraulic control has been announced by the Athey Products Corp., 5631 W. 65 St., Chicago 38, Ill. The Model 3 Athey loader is designed for use on such jobs as road widening and resurfacing, ditch building and cleaning, dressing slopes, loading oil-mix, etc., and works as a companion tool with the Caterpillar motor grader.



The new Model 3 Force-Feed Loader is featured by finger-tip hydraulic control.

Finger-tip hydraulic control provides four levers for raising and lowering feeder, moldboard, throat, and conveyor. Other features are a roomy operator's platform, new conveyor and throat design, positive belt alignment, more accessibility, and greater loading efficiency.

The new machines will be sold through Athey-Caterpillar distributors throughout this country and abroad.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.

WHY POUR CONTRACTING DOLLARS "DOWN THE DRAIN"?

Experienced contractors have long known how ARMCO Perforated Pipe helps clinch profitable subdrainage bids. Today the time- and labor-saving features of this pipe are more important than ever.

Savings start the minute you begin to transport ARMCO Pipe to the job site. Although amply strong it is light in weight for easy handling, loading and hauling. Fewer trips and less labor are needed and there is no danger of breakage. A small unskilled crew can quickly install an ARMCO subdrainage system. With simple band couplers you speedily join long lengths into a sturdy conduit that resists shifting soils, frost action and the weight of heavy traffic.

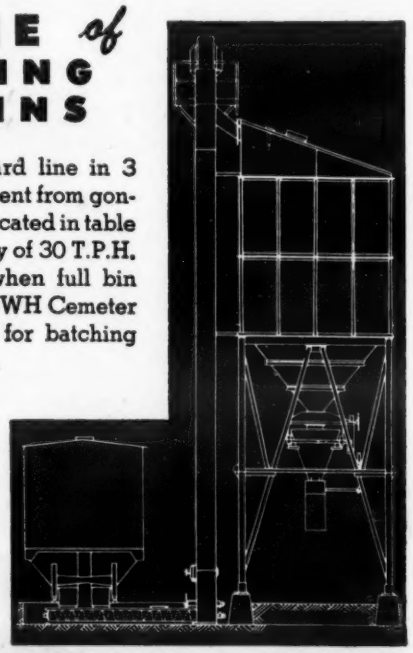
Engineers are usually familiar with Perforated Pipe and accept your bid with confidence. They know it keeps subgrades dry and firm, provides freedom from failure, lowers maintenance expense and protects their investment.

With ARMCO Pipe you are always sure of a first-class job —the kind that lives up to specifications and means future business. Write us for detailed information. Armco Drainage & Metal Products, Inc., 1185 Curtis Street, Middletown, Ohio.

ARMCO PERFORATED PIPE

A NEW LINE of CAR LOADING CEMENT BINS

WE have developed this standard line in 3 popular sizes for hauling bulk cement from gondola cars to bin. Capacities are indicated in table below. Bucket elevator has capacity of 30 T.P.H. High level bin signal indicates when full bin capacity has been reached. Type DWH Cemeter provides 8 to 20 cu. ft. capacity for batching service. *Write for complete data.*



BIN	CAPACITY	
	CU. YDS.	BBLS
1	29	172 to 194
2	45	270 to 304
3	73	437 to 492

ERIE AGGREMETER PLANTS

Erie Steel Construction Co., 273 Geist Rd., Erie, Pa.

BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS

ETNYRE

"Black-Topper"

BITUMINOUS DISTRIBUTORS

ACCURATE . . . DEPENDABLE . . . ECONOMICAL—Reduce maintenance and operating expenses, cut labor costs, insure accurate, uniform coverage with dependable Etnyre "Black-Toppers". Designed to do the job better . . . faster . . . cheaper. See your Etnyre dealer or write us today for complete details.

E. D. ETNYRE & CO., Oregon, Illinois

Light Grading For Road Jobs

One Contractor Handled Two Jobs 20 Miles Apart Using Tractor-Scrapers; Test Sections for Joints

✦ ON contracts for two new concrete highways in southern Virginia, W. H. Scott, a Franklin, Va., contractor, used rubber-tired tractors and scrapers to good advantage. He employed them on both jobs for light, fast hauls during the grading operations which preceded the concrete paving. Although the two projects were 20 miles apart, the major earth-moving equipment in use was quickly shifted about as required.

The two contracts were awarded by the Virginia Department of Highways. They included a 5.1-mile stretch of 24-foot concrete on U. S. 58 between Capron and Courtland in Southampton County; and 5.2 miles of similar construction on State Route 189 west of Holland in Nansemond County. The contract prices were $361,200 and $352,448 respectively. A paving feature of the latter project was a number of different experimental sections with various spacings of expansion and contraction joints, all with reinforcing-steel mesh, and one section in which the reinforcing was omitted entirely.

The contractor made a start at the job near Holland in February, 1946, but did not get into full swing until the middle of April. He began work on his other project the middle of March. Both were completed during 1946.

On both, the grading was fairly light, since the original roads were built to good alignment with easy curves, flat grades, and long tangents. U. S. 58 between Courtland and Capron, important east-west highway crossing Virginia from the mountains to the sea, has been straightened still more in the interest of safe driving. It now has tangents of 3,400, 4,400, 4,500 and 4,600 feet. The vertical profile has also been flattened, with the grades now averaging about 1 per cent.

Grading, Courtland to Capron

The former highway was a 22-foot bituminous surface treatment on a soil base rebuilt by convict labor in 1930. As the new center line rests practically on the old over most of the route, the grading was chiefly a widening operation on both sides. The base for the pavement was widened from 22 to 24 feet, and the shoulders from 8 to 14 feet. The new 14-foot shoulders have a slope of ¾ inch to the foot for the first 6 feet; from that point there is a break direct to the ditch line for the final 8 feet.

The cuts and fills balanced without the use of any of the old bituminous pavement. It was scarified with a Caterpillar No. 12 grader so that it was easily removed and wasted on the sides of the fills. The old pavement was considered unsuitable material as a foundation for the new road, which is built in certain locations on a 6-inch layer of granular-material subgrade spread the full width of the roadway including the shoulders.

All earth-moving was done by a fleet of six Caterpillar DW10 rubber-tired tractors pulling 8-yard scrapers. This equipment averaged 15,000 yards of material in a week of six 10-hour working days. Over the entire job the hauls were short, averaging 400 feet. No difficulty was experienced in the excavation since the soil, part clay and part sand, contained no rock. Two tractor-dozers, a Caterpillar D8 and an International TD-14, spread the fills in 6-inch layers. They were compacted by an International Farmall tractor fitted out with sheepsfoot pegs in its rear steel wheels.

In six different areas the subgrade material was deemed too unstable a foundation for the new road, so a 6-inch layer of subgrade was placed. The material was obtained from five borrow pits, all within ¼ mile of the job. The same equipment used in the earth work was employed in excavating, hauling, spreading, and compacting the granular borrow. A typical specimen showed the following gradation:

Sieve Size	Per Cent Passing
No. 10	100
No. 20	99.8
No. 40	99.4
No. 60	96.8
No. 80	84.6
No. 100	66.2
No. 200	40.2

Drainage Structures

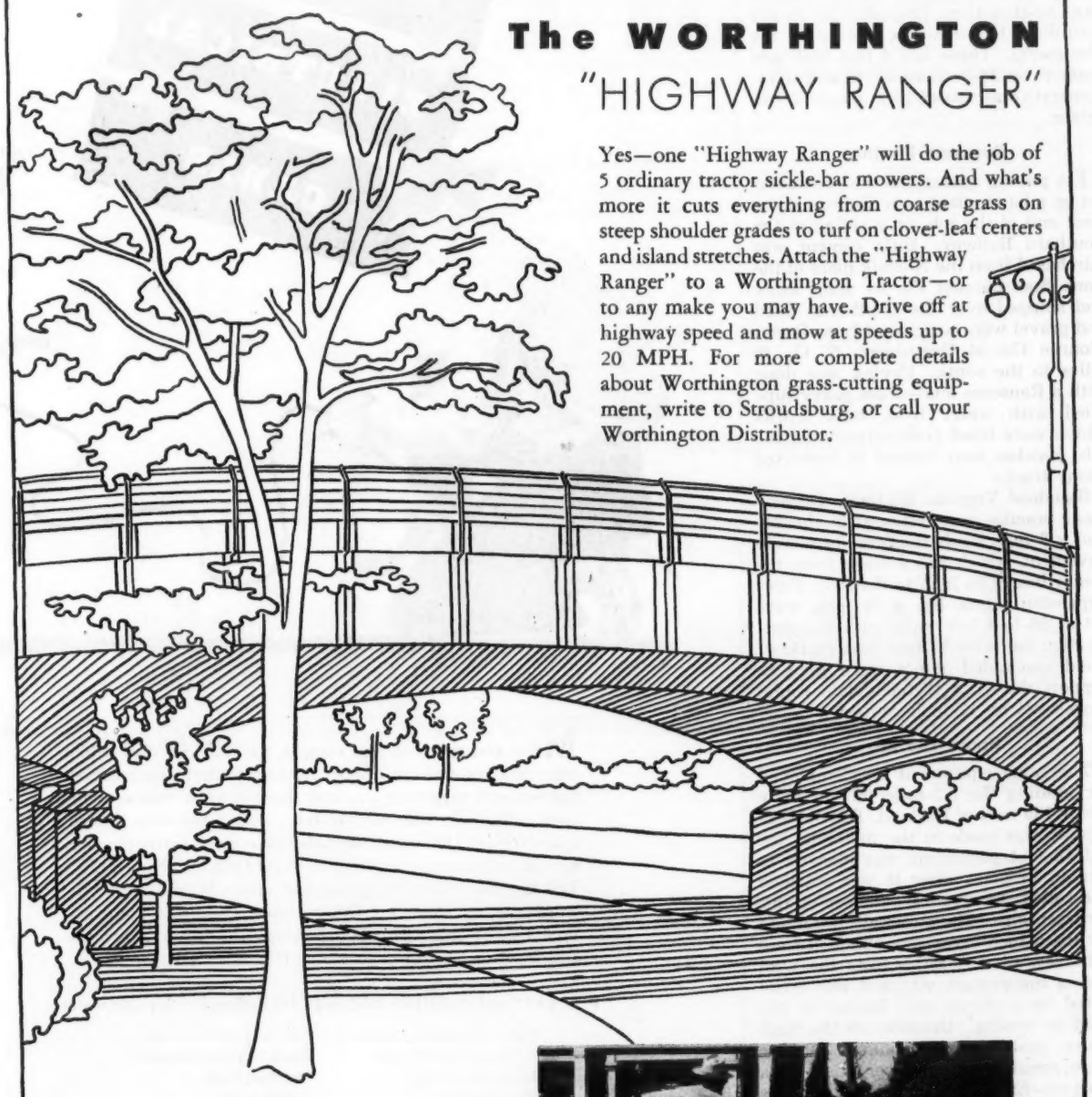
Drainage structures, including pipe and culverts, were lengthened to serve the widened roadbed. So were two concrete bridges which are supported on wooden pile foundations. This work was sublet to Herbert Barksdale of Franklin, Va. The bridges, with spans

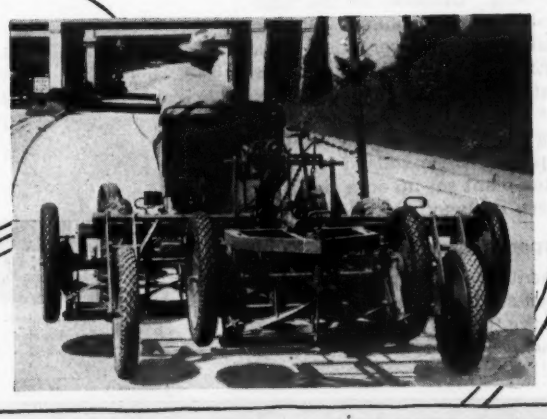
(*Continued on next page*)

Grass-cutting capacity—5 times greater!

The WORTHINGTON "HIGHWAY RANGER"

Yes—one "Highway Ranger" will do the job of 5 ordinary tractor sickle-bar mowers. And what's more it cuts everything from coarse grass on steep shoulder grades to turf on clover-leaf centers and island stretches. Attach the "Highway Ranger" to a Worthington Tractor—or to any make you may have. Drive off at highway speed and mow at speeds up to 20 MPH. For more complete details about Worthington grass-cutting equipment, write to Stroudsburg, or call your Worthington Distributor.





WORTHINGTON MOWER COMPANY

STROUDSBURG, PENNSYLVANIA Established in 1914

Division of Jacobsen Manufacturing Company

Fast Job-to-Job Moving Saves $$$

Today's increased cost of construction equipment requires top earnings from your investment.

Reducing job-to-job moving time to a minimum assures less idle time for every dollar of your equipment investment.

Consult your La Crosse dealer and he will show you why we say "Ship it Quick! Ship it Safe! Ship it on a La Crosse Trailer."

HEAVY DUTY LA CROSSE TRAILER CORPORATION

LA CROSSE, WISCONSIN U. S. A.

Dealers in all 48 States.

Light Grading

(*Continued from preceding page*)

of 14 and 16 feet respectively, were widened from 23 to 42 feet. The piles to hold the abutment footing extension are 35 to 40 feet long, with 8-inch tips and 12-inch butts. They were driven to 30-foot penetration by a 3,400-pound gravity hammer suspended in 33-foot swinging leads from a Lorain Moto-Crane equipped with a 40-foot boom. The piles were cut off with a crosscut saw so that they projected 18 inches into the 3-foot concrete footing for the abutments. These are 9 feet high and support an 18-inch concrete slab deck. Concrete was mixed in a Jaeger 2-bag mixer.

Concrete Paving

For paving operations the contractor set up a batch plant near Capron at the west end of the job, on a siding of the Southern Railway. Bulk cement was purchased from the Norfolk plant of the Lone Star Cement Co. 60 miles away and shipped over the Southern. Sand and gravel were purchased from Bryan Monroe Co. at Garysburg, N. C., 40 miles to the south. Paving was done with a Ransome dual-drum paver supplied with water from tank trucks which were filled from streams on the job. Batches were hauled in converted Army trucks.

Standard Virginia Highway Department practice was followed in the 24-foot x 9-inch mesh-reinforced concrete pavement, which has a slope from the center line of ⅛ inch to the foot. Fiber expansion joints, 8½ x ¾-inch, were set at 90-foot intervals, with the contraction joints on 30-foot centers. Dow-Weld assembled joints were used to support the ¾ x 12-inch plain round dowels set on 12-inch centers.

Route 189 Job

The same equipment was employed for grading the 5.2-mile job on State Route 189 west of Holland. But one exception was made in the methods: the old 18-foot pavement was allowed to remain in place after it was scarified and rolled. Excavation balanced on this contract, also. The subgrade treatment for the 6-inch layer was obtained from a borrow pit 1½ miles from the west end of the project, where it was excavated by a shovel and hauled to the road in trucks. Because of the high water table, many drainage ditches were required. These were dug by a Bucyrus-Erie 10-B drag shovel. Other drainage structures included three box culverts of 10 x 6, 6 x 6, and 4 x 4 feet. Concreting operations for the 24-foot x 9-inch paving were started in May, with a batch plant set up on a siding of the Southern Railway near Holland.

Experimental Sections

Experimental sections were paved on this contract so that highway engineers might observe the results obtained from varied spacing of expansion and contraction joints in both reinforced and plain concrete. After a 40-foot roadway section had been paved for a short distance through the town of Holland, the experimental work started when the 24-foot paving width was reached beyond the town. The first 18,000 feet is mesh-reinforced concrete and is divided into four sections. The first section of 1,500 feet has expansion joints on 500-foot centers with contraction joints at 20 feet; the next 3,000-foot stretch has expansion joints every 1,000 feet and contraction joints every 25 feet; for the next 4,500 feet the expansion joints are at 1,500-foot spacing and the contraction joints at 30-foot intervals. Then for 9,000 feet, standard highway practice was followed with expansion joints at 90 and contraction joints at 30 feet.

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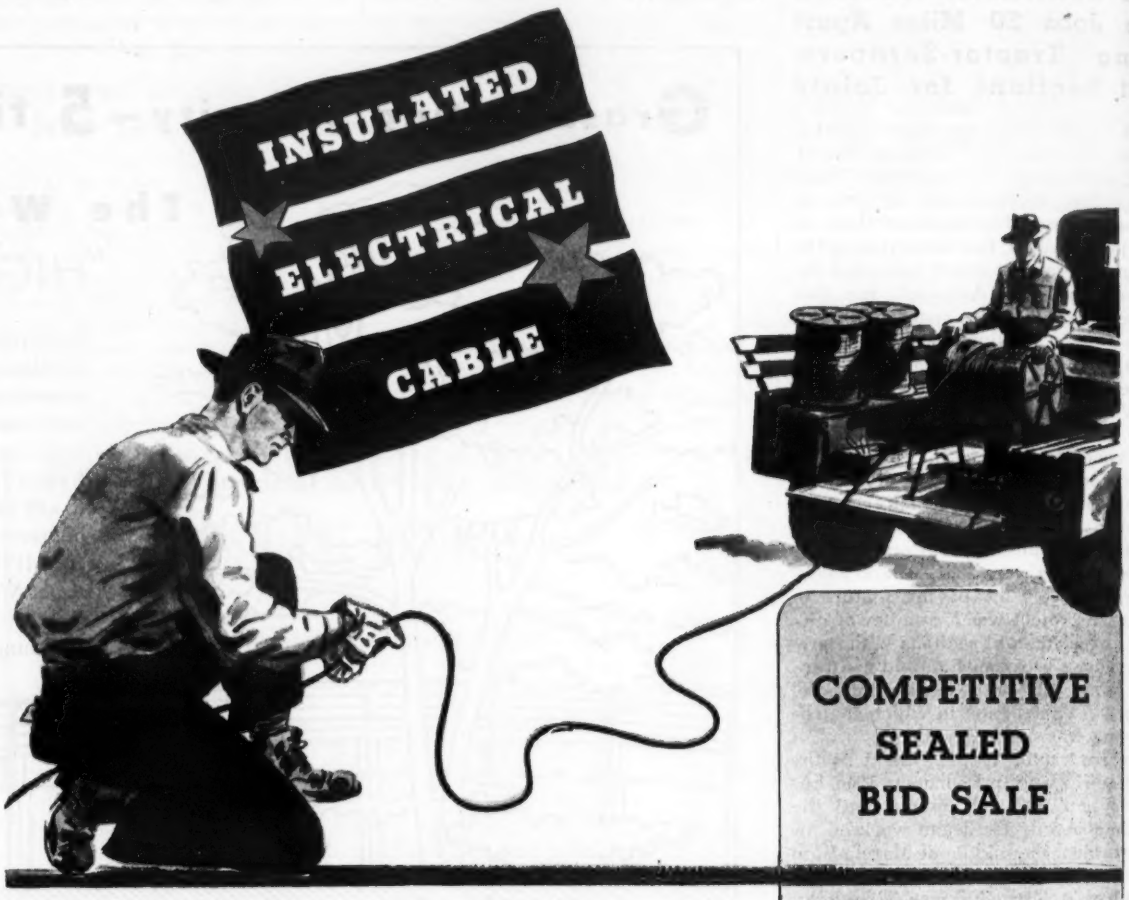

COMPETITIVE SEALED BID SALE

Miles and miles of this rugged, *unused* wire and cable offer money-making opportunities to alert commercial buyers and exporters . . . and these buyers "name their own prices" in this easy-to-buy, sealed bid sale. Large quantities of this valuable material, conveniently packed in coils or on reels, are held by New Orleans, New York, Los Angeles, San Francisco and other War Assets Administration Regional Offices shown below. Your inspection of this material is invited. Address your inquiries directly to the Regional Offices listed below.

U. S. NAVY and MARITIME WIRE and CABLE offered in this sale feature:

Rubber and synthetic insulations	1,630 to 2,000,000 circular mils
Voltage rating of 300 to 600	One to forty-four conductors
Basket weave armors	Identifying braids
Varnish cambric	Rubber jackets
Asbestos braids	Cotton braids
Plastic sheaths	Lead sheaths

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HOW TO BUY:

Valuable equipment and materials, such as this U. S. Navy and Maritime Wire and Cable, are constantly being offered by all of the Regional Offices listed below. Sales are conducted on both competitive sealed bid and fixed price basis. Dates of sales—and conditions governing all transactions—will be sent to you upon request. Request should be made directly to Regional Offices. To keep completely informed on commodities inventories, minimum and maximum purchases, dates of sales, etc., of each Regional Office, requests should be made to be placed on the mailing lists of each and every Regional Office which could serve your needs.

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EXPORTERS:

Your business is solicited. Exporters are considered as wholesalers in the purchase of surplus property. Any questions on export control should be referred to Office of International Trade, Department of Commerce, Washington 25, D.C.

MARTIN CARRYHAUL TRAILERS

TRADE MARK REGISTERED

MARTIN CARRYHAUL TRAILERS
"Make Hauling A Pleasure!"

Ease of loading, dependability and economical operation are three Martin CARRYHAUL Trailer characteristics which make them the leaders in the field.
Regardless of your hauling job, there's a proper size Martin CARRYHAUL Trailer to do it for you safely and economically.

Your "CATERPILLAR" Dealer is your MARTIN Dealer. See him for your trailer needs.

MARTIN MACHINE COMPANY
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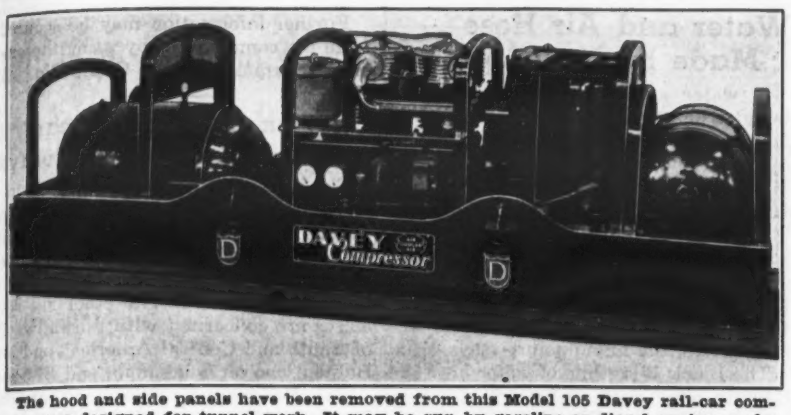


The hood and side panels have been removed from this Model 105 Davey rail-car compressor designed for tunnel work. It may be run by gasoline or diesel engine, or by electric motor, and it comes in five capacities.

Compressor Designed For Work in Tunnels

Production has begun on a rail-car compressor for tunnel work which is manufactured by the Davey Compressor Co., Kent, Ohio. The units will be made in 60, 105, 160, 210, and 315-cfm capacities, and will be mounted on a welded structural-steel chassis.

These two-stage compressors may be run by gasoline or diesel engine, or by electric motor. The gas and diesel units include a throttle control and unloader which is said to regulate pressure and acceleration automatically. The electrically driven units have automatic controls and explosion-proof electrical equipment. The 60 and 105-cfm models can also be obtained as single-stage compressors.

Cars are made for either standard or narrow-gage track. Springs and wheels are standard mine-car type. Axle assemblies are ball-bearing-equipped and sealed against dust and dirt. Standard equipment includes a heavy metal canopy with open sides and doors for ready access and ventilation. Tool box and kit are included. Self-propelled rail cars can be furnished on special order.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33.

SKF Appoints Aiken

The appointment of William L. Aiken as Senior Division Engineer in charge of the Automotive and Marine Department has been announced by SKF Industries, Inc., Philadelphia, Pa., maker of ball and roller bearings.

Mr. Aiken is a graduate of the U. S. Naval Academy and Carnegie Institute of Technology. He is a member of the Society of Automotive Engineers, the American Society for Metals, and the Army Ordnance Association.

Light Grading

(*Continued from preceding page*)

The final 7,889 feet of pavement is non-reinforced, with the contraction joints set at a uniform spacing of 20 feet. For the first 1,000 feet the expansion joints are on 500-foot centers; for the next 2,000 feet they are on 1,000-foot centers; and for the next 3,000 feet they are on 1,500-foot centers. In the final 1,889-foot section the dowels were left out of the contraction joints, and an expansion joint was installed only at each end. With this single exception, the contraction and expansion joints have ¾ x 12-inch dowels inserted at half the pavement depth on 12-inch centers. Throughout the job a tongue-and-groove longitudinal joint was used with ½ x 30-inch deformed tie bars set on 30-inch centers.

Quantities and Personnel

The following major items were included in the two grading and paving contracts:

Description	U. S. 58	State Route 189
Clearing and grubbing	5 acres	7 acres
Excavation	87,642 cu. yds.	56,659 cu. yds.
Concrete pipe	468 lin. ft.	603 lin. ft.
Subgrade treatment	29,060 cu. yds.	31,574 cu. yds.
Concrete pavement	71,914 sq. yds.	73,593 sq. yds.

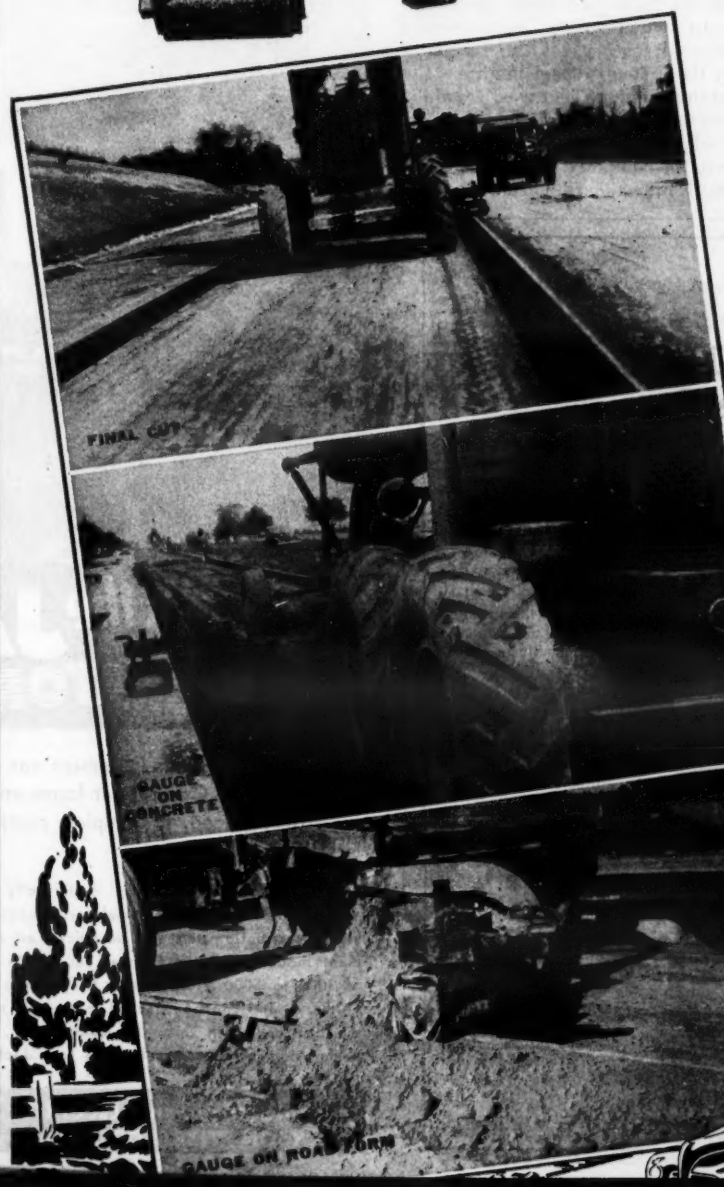
On the U. S. 58 project, Courtland to Capron, J. E. Johnson was Resident Engineer and C. W. Guerrant, Inspector. On the State Route 189 job, E. D. Hubbard was Resident Engineer and E. C. Ramsey, Inspector. R. Smith was General Superintendent for W. H. Scott, the contractor. The Virginia Department of Highways is headed by James A. Anderson, Commissioner, with C. S. Mullen, Chief Engineer, and T. F. Loughborough, Construction Engineer.

Pioneer Names Rundquist

The appointment of W. A. Rundquist to the position of Sales Promotion Manager has been announced by Pioneer Engineering Works, Inc., Minneapolis, Minn. He will be in charge of advertising, sales promotion, and sales training.

HERE'S A NEW GAUGE

THAT WILL CONVERT YOUR STANDARD ROAD GRADER INTO A FINEGRADING MACHINE IN 10 MINUTES



It's as easy as ABC to attach these gauges to your road grader. One man (your operator) can do the job.

There is no guesswork. With a few simple adjustments you can finegrade accurately to any desired depth.

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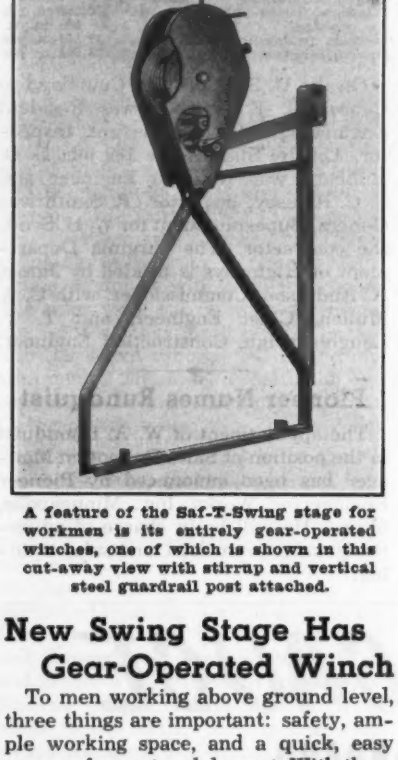

A feature of the Saf-T-Swing stage for workmen is its entirely gear-operated winches, one of which is shown in this cut-away view with stirrup and vertical steel guardrail post attached.

New Swing Stage Has Gear-Operated Winch

To men working above ground level, three things are important: safety, ample working space, and a quick, easy means of ascent and descent. With these requirements in mind, Safway Steel Products, Inc., 6222 W. State St., Milwaukee 13, Wis., has designed the Saf-T-Swing stage for maintenance work, bridge painting and cleaning, form work, and other similar jobs.

The swing consists of two Saf-T-Winches entirely gear-operated. A steel gear housing prevents foreign matter from entering the gears and gives added protection to the operator. Each winch is equipped with 150 feet of 5/16-inch 6 x 19 mild plow-steel wire cable. A stirrup which will take a platform up to 28 inches in width is bolted to each winch; it can be removed for storage. A guard-rail post is welded to each stirrup.

The swing is raised and lowered, by means of a crank handle, at the rate of 75 feet in 10 minutes, according to figures made available by the company. A positive-lock mechanical brake in the crankshaft assembly is said to engage automatically when the operator removes his hand from the crank handle. Another safety feature is a lever, located at the top of the winch, which must be released in order for the operator to crank the winch down. If the operator removes his hand from the lever, the lowering of the winch automatically stops.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

Bins for Aggregate

Steel aggregate bins in four capacities are made by the Construction Equipment & Mfg. Co., 2430 University Ave., St. Paul 4, Minn. Available in 21, 28, 33, and 38-cubic-yard sizes, the single and double-compartment bins are made of 3/16 and ¼-inch steel plates featuring strong reinforcement and heavy welding. They are of the hopper type with bottom discharge.

The one-way rolled gates have long handles which permit the operator to stand well back from trucks. The bins have structural angle legs that are heavily braced. The tops of the bins are 15 feet 8 inches above the ground, and the hopper bottoms are 7½ feet above ground.

A special gear hoist with crank and cable lift on each leg enables two men to raise or lower the bins quickly and easily, it is reported. For transportation from job to job, the legs are removed and the bin can be carried on a 1½-ton truck to its next location.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 35.

Diesel Wheel Tractor

A catalog describing its DW10 tractor has just been issued by the Caterpillar Tractor Co., Peoria 8, Ill. This tractor is a rubber-tired machine designed and built for heavy off-the-road earth-moving operations.

Catalog No. 9358 has large detailed photographs which show operational and functional features of the tractor, including the 100-hp diesel engine. It also contains action pictures, model views, and brief specifications.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 93.

Water and Air Hose Made by New Method

A water and air hose, featuring a body structure based on a new manufacturing principle, has been announced by the Goodyear Tire & Rubber Co., Mechanical Goods Division, Akron 16, Ohio.

It is claimed that the method of horizontal braiding used for bonding cover, carcass, and tube together gives the new hose a rope-like flexibility. At the same time, it maintains the maximum of ruggedness, the manufacturer says.

The Black Wing line of water hose is built in sizes ranging from ¾ to 2½ inches. The Black Wing line of air hose is manufactured in two types, a two-braid standard for service with pneumatic tools, and a three-braid heavy-duty type for use with air drills. Sizes range from ⅜ to 1½ inches. Both products utilize a cable cotton body for greater carcass strength, and a seamless tube which is said to be unaffected by lubricants.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 22.

Data on South American Highways and Railways

The Department of Commerce has informed us that ten issues have been added to the "Industrial Reference Service" series of articles. Four of these cover the highways of Bolivia, Uruguay, Ecuador, and Chile. The other six releases are concerned with the railways of South and Central America: one on Bolivia; one on Guatemala and El Salvador; Uruguay; Ecuador; and one on Honduras, Nicaragua, Costa Rica, and Panama.

Copies of these releases are available at the rate of 5 cents per issue or at a yearly subscription rate of $1.50. A complete list of titles, and other information, may be obtained by writing to the Department of Commerce, Office of International Trade Operations, Washington 25, D. C.

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... iffy ... a twist of the wrist ... it ... you the EXACT heat for any ... electrode.

You don't have to "fiddle around" with complicated control devices with a Hobart. Just set the large wheel for the range and flip the small wheel to get the finest sort of adjustment. Operators save time and steps, too, with Hobart's **Remote** Control of the fine adjustment. (An exclusive Hobart feature.)

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The JACKSON Paving Tube is perfectly adaptable to slabs 6" to 24" thick, without affecting the efficiency on single or two-course standard plain or reinforced concrete pavement construction and may be quickly adjusted from 10' to 25' widths in the field. Power Plant mounted on the Finisher has ample reserve power through entire frequency range of 3000 to 5000 VPM. Finger tip controls. Quickly and easily attached to any standard finisher — and can be attached to the rear of standard spreaders to advantage for vibrating the first course in thick slab construction. One of the best investments in equipment a paving contractor can make. See your Jackson distributor or write for further information.

Manufactured by ELECTRIC TAMPER & EQUIPMENT CO. for JACKSON VIBRATORS, INC. LUDINGTON, MICH.

Foundation Columns Are Anchored in Rock

(*Continued from page* 1)

The rock to which they were driven drops off sharply in the direction of the East River; the overburden varies from 60 feet thick at the west end of the plot to 145 feet thick at the east end, which is about 125 feet back from the edge of the water. Consequently the actual lengths of the caissons vary from 60 to 145 feet, while the load that each carries ranges from 500 to 1,100 tons.

A unique feature of the design brings the caissons right up to the second floor level where they tie in to the steel framework of the building. Thus they really act as fixed columns, making a rigid structure anchored in rock at the bottom and secured to the floor system on top. The floor system consists of double continuous girders. This design not only reduces the overall depth of the floor slab but also contributes to the stiffness desired at the top of the long caissons.

In addition to these forty 30-inch caissons under the central portion of the building, the outer foundation consists of sixteen Tuba Steel cylinders. These have a ½-inch shell thickness, and are 18 inches in diameter with sections 40 feet long. The sections were driven at depths of 115 to 132 feet, excavated, and filled with concrete.

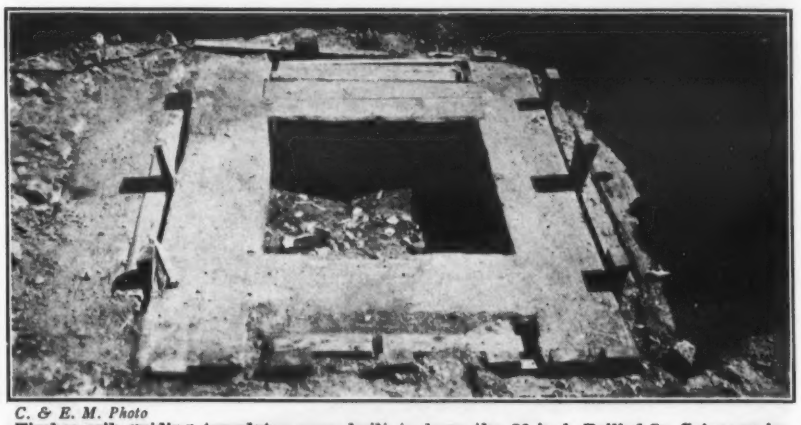
For light loads around the outer edge of the site, twenty-four pointed Tuba Steel cylinders with a diameter of 10 inches and a thickness of ⅜ inch were driven to 30-ton bearing. As it was unnecessary to drive these smaller 10-inch piles to rock, their ends were closed with cast-steel points for driving, and later they too were filled with concrete. The carrying capacity of these piles is derived almost entirely from end bearing so that movements in the upper strata have no effect on them, nor would other adjacent operations in the future. The heavy steel shell is a good factor of safety and also permits penetration through heavy strata of overburden and other obstacles.

The caisson shells were made up at the Middletown, Ohio, plant of the Carnegie-Illinois Steel Corp. They were shipped by rail to New Jersey, where they were transferred to lighters and brought up the East River to a point on the Drive opposite the job site. There the derrick on the lighter picked up the sections and swung them to a pole truck and trailer on shore, which carried them across the street where they were unloaded by crane.

In the meantime the buildings on the block had been razed, a lot of old concrete had been broken up and removed, and the site left in clean shape for the new construction. During these clean-up operations a Kadco vacuum dust-control system was employed to collect dirt and dust raised by the workers.

Driving Caissons

Timber-crib guiding templates, in which the caissons were set, were first framed into the ground within a hole dug a couple of feet below the surface. They were made of 12 x 12-inch timbers with mortised joints, and they had an inside dimension 34 inches square. These cribs are built to keep the caisson in exact position during the driving. The space between the outside of the 30-inch cylinder and the sides of the crib is taken up by angle-iron guides.



C. & E. M. Photo
Timber-crib guiding templates were built to keep the 30-inch Drilled-In Caissons in position during driving. They were made of 12 x 12-inch timbers with mortised joints.

An Osgood crane with a 50-foot boom then picked up the 70-foot caisson sections and brought them to the big driver. There they were placed in the crib frame and plumbed before driving started. During the driving the shells were constantly checked for plumbness by two transits set at right angles to each other. To protect the shell from damage during the driving and to provide a base for seating it in bedrock, a specially tempered tool-steel cutting edge was welded to the bottom of the first caisson section. This increased the diameter of the pipe to 32 inches for the lower 2 feet, with the cutting shoe cut back from the bottom at a 45-degree angle.

The driving rig is 110 feet from base to jib, weighs 45 tons, and has 90-foot fixed steel leads. With its 16-foot-diameter turntable, it can turn or drive at any angle. Its working base is 16 feet square, but the steel cribbing of 15-inch H-beams on which it moves forward, backward, or sideways by an intricate system of reaving is 30 x 40 feet. Designed and built by the Drilled-In Caisson Corp., it is one of only four

(*Continued on next page*)

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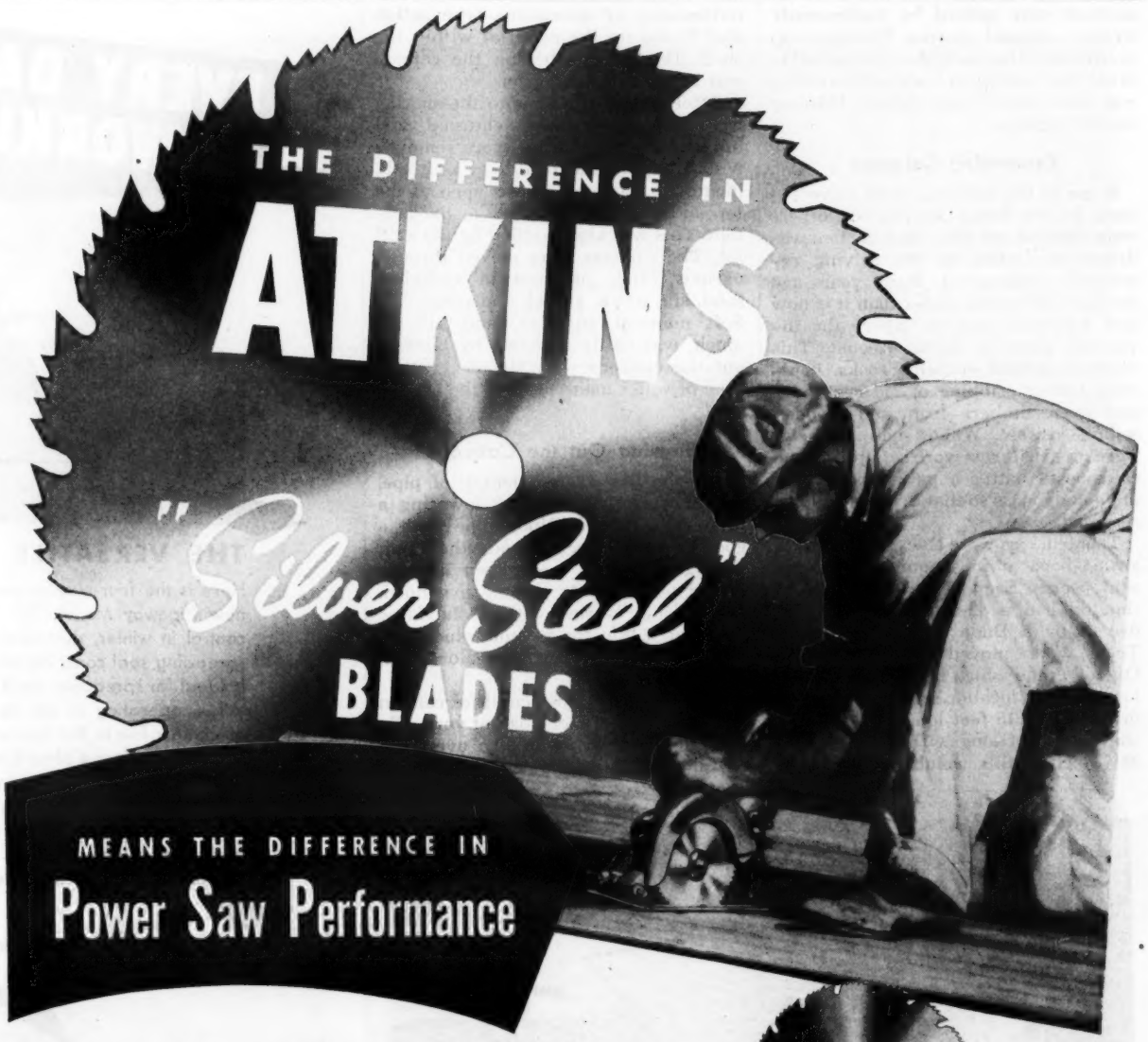

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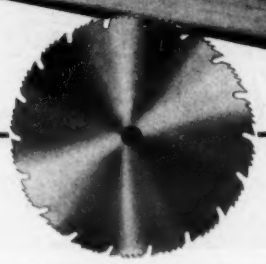

Atkins No. 37 Mitre Tooth Saw, shown above, is a combination rip, crosscut and mitre saw — highly popular with users of portable machines. Pictured below are two of many other available tooth styles.

Rip tooth, for smooth high-speed ripping.

Crosscut tooth, for fast, easy crosscutting

NOTE: While Atkins does not manufacture portable machines, many leading machine manufacturers look to Atkins for blades.

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ATKINS

Foundation Columns Are Anchored in Rock

(*Continued from preceding page*)

similar rigs in the country, and is equipped with an American whirley 3-drum hoist. A 45-hp coal-burning boiler furnishes steam for its operation and for lifting the Vulcan No. 0 single-acting hammer which has a 30-inch driving head.

The Tuba Steel cylinder piles were driven by a Vulcan No. 1 single-acting hammer; it operated in the 50-foot fixed steel leads of a Marion crane with a 55-foot boom. This rig was powered by a 40-hp oil-burning boiler. The Osgood crane, besides handling equipment and material, also was available for driving purposes with a 40-hp coal-burning boiler.

After the initial section was driven to ground level, an additional length was placed on top of it and the two sections were spliced by continuously welded external sleeves. Driving continued and other sections were added to bring the caisson to rock. Job welding was done with three Hobart 400-amp electric welders.

Excavating Caissons

Some of the caissons were driven to rock before being excavated; others were cleaned out after each section was driven, according to the driving resistance encountered. Many years ago the East River was wider than it is now and extended back to where the industrial plant is being erected. This filled-in ground contains rocks, boulders, timber cribbing of old sea walls, and even timbers from old wooden sailing vessels. When such obstacles were met, drill rigs were set up over the caissons to batter a path through the unyielding mass so that driving could be resumed.

The drill rigs were Bucyrus-Erie 29W strong-back units, mounted on steel skid beams. Each of the two units on the job had a 42-foot mast and was driven by a Buda 70-hp gas engine. They were moved readily by the Osgood crane which shifted them about to whatever location was desired. The drill itself is 15 feet long and carries a star bit 5 feet long with a diameter of 28½ inches; this weighs 1,800 pounds and just fits the caisson, which has an inside diameter of 29 inches. Using a 40-inch stroke, the drill was worked up and down inside the caisson with a pulverizing or concussion-type action that broke up the material within the shell. During the drilling the caisson was kept filled with water.

C. & E. M. Photo
Steel skid beams carried the Bucyrus-Erie drill rigs which Spencer, White & Prentis used to batter a path through rocks and boulders so that caisson driving could be resumed on the East River Drive job in New York City.

After the obstructions to the sinking of the caissons were churned and broken into pieces, they were removed with a bailing bucket 10 feet long x 16 inches in diameter; it was open at the top and had an outlet gate at the bottom. This was also handled by the drill rig. The caissons were driven through various kinds of material including sand, silt, muck, gravel, and some clay. Soft material, such as sand, silt, or muck, was easily removed by blowing out the caissons with air jets, with a head of water maintained in the caisson shell.

Blowing Out the Caissons

For the first 70-foot length of pipe, the blowing was done by lowering a 60-foot length of 3-inch pipe with a gooseneck connection on the end; through this air was blown at 100-pound pressure. As the air expanded, it rose and carried with it the loose material within the caisson which was sprayed out over the ground along with the water.

For more than one length of caisson the gooseneck air jet was not very efficient in a 30-inch pipe. To overcome this inadequate lifting action in the big pipe, a smaller 16-inch pipe was lowered into the caissons. It was made up of 40-foot sections joined together by flange connections having sixteen inch bolts with a cone-shaped end to seal off the bottom. By means of the cone, the diameter of the pipe increases from 16 to 23½ inches in the final 5 inches. To make a tight connection between the end of the cone and the inside of the caisson, three rings of rubber hose were wrapped around the outside of the cone and fastened firmly in place with wire stirrups and bolts. These rubber rings made a snug fit and the air jet, working in a 16-inch pipe, did more efficient work in the confined blowing area.

Compressed air for the job was furnished by a battery of three Chicago Pneumatic 720-cfm diesel-driven compressors. They pumped into a central receiver made by sealing up the ends of four lengths of 70-foot 30-inch caisson pipe. The sealing was done with ⅞-inch steel plate. It was cut to fit into the end of the pipe, with the edges beveled back the thickness of the plate. Then it was welded in place by building up a weld

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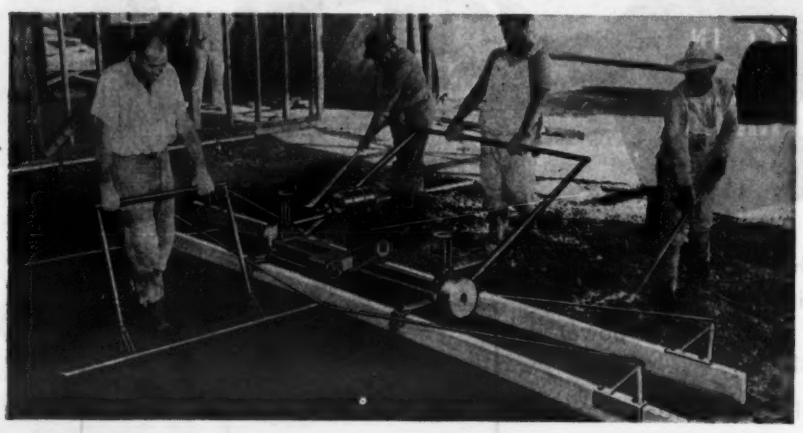

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This portable Rodding Machine produces better concrete . . . rods the slab to a perfect level, compacted . . . ready for floating and finishing. Model "RS", for slabs 3 to 10 ft. wide. Also in Model 44, for slabs 10 to 20 ft. wide. Hand Grill Tamper at left, for tamping down larger aggregate, eliminates use of dry topping.

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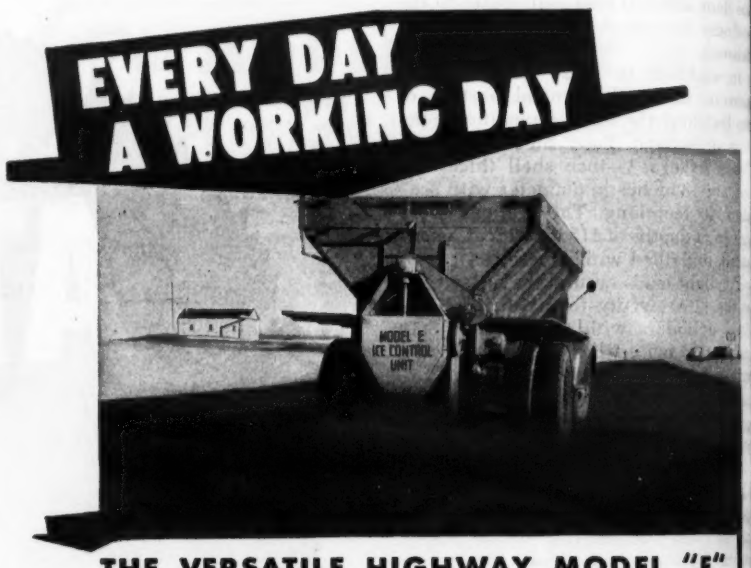

THE VERSATILE HIGHWAY MODEL "E"

Here is the four-way answer to street and highway problems. The new *Highway Model "E" Spreader* can be used for positive ice control in winter, dust control with calcium chloride in summer, for spreading seal coats on oil, and, by removing the distributor disc it is ideal for spreading small rock and chips for shoulder maintenance. When operating as an ice control unit, the *Model "E"* casts sand or cinders *low* to the highway, eliminating interference with traffic. Material is spread ahead of rear wheels of truck providing traction for truck and *safety* at any operating speed. It will cover the full width of a 2 or 4-lane highway in one operation. All controls are within easy reach of the driver's seat making the Model "E" a labor saving, one-man unit. Furnished in four lengths to fit any truck chassis. Write for complete details.

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AVAILABLE IN SIZES FROM 8 TO 13 FOOT WIDTHS.

COMPARE THESE TIME AND MATERIAL SAVING FEATURES

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- Reversible transmissions permit forward or reverse motion simply by shifting lever.
- Swivel type self-coupling adjustable hitch allows traction wheels to remain in constant contact with ground regardless of position of truck or spreader. Entire unit is balanced for easy hook-up to truck.

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MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADER

Foundation Columns Are Anchored in Rock

(Continued from preceding page)

round the circumference ½ to ¾ inch thick. The round plates were set into the pipe about 5 inches and were reinforced by two steel braces, ⅝ inch thick x 5 inches deep, welded across the ends of the pipe.

The three compressors were hooked up to one unloader, as the unloaders on two of the compressors were turned off. Air was carried from each compressor in a 4-inch pipe to a common 6-inch pipe. This led to a small receiver, 12 feet long x 4½ feet in diameter, which was used for minor work when only a small amount of compressed air was required. From this receiver a 6-inch pipe led to a manifold in front of the four caissons strung out side by side, with an outlet from the manifold into each receiver. Through a quick-acting valve off the end of this manifold, air was piped around the entire job site for use as needed at 100-pound pressure. Water lines connecting with city hydrants were also available at any point within the fenced-off construction scene.

Anchored in Rock

The necessary number of sections were added to the caissons and driving was continued until bedrock, a mica schist, was finally reached by the steel driving shoe of the caisson. When forty blows of the big hammer were required to get 1 inch of penetration, the driving crew knew that they had struck rock. The hammer was then raised and a sleeve or band was slipped around the caisson at the elevation where it was to be cut off with a torch.

Next, the caisson was excavated to rock in the manner previously described, and afterwards a socket was drilled into the rock with the star bit. The sockets are the same diameter as that of the caissons, and vary in depth from 2 to 8 feet according to the loads which the individual caissons will carry. The shells were then re-driven slightly until the driving shoes were firmly seated in the rock; this prevented any inflow of sand, silt, muck, or other soil into the caissons underneath the cutting edges.

During the drilling the rock fragments were bailed out and collected for inspection so that the nature of the rock on which the structure rests was exactly determined. A full head of water was kept in the caisson during the drilling and bailing. But when the socket in the rock was drilled to the required depth, the caisson was then bailed dry. This permitted visual inspection of the interior of the caisson and the rock socket by lowering a man down in an inspection cage. Thirty-five out of forty caissons were open for visual inspection.

The socket and caisson were then filled to a point about 3 feet above the cutting edge with a 1:1 mix of sand-cement grout to make a water-tight seal at the bottom of the caisson. Grouting was done with a tremie bucket since the caissons were kept filled with water after excavating and cleaning.

C. & E. M. Photo

Compressed air for the New York City foundation job was furnished by a battery of three Chicago Pneumatic 720-cfm diesel-driven compressors.

Steel Cores

Following in close sequence behind the grouting operations, steel cores were lowered to the bottom of the caisson sockets by a Lima crane with an 80-foot boom. These cores are 14-inch H-beams weighing from 68 to 342 pounds per foot, according to the designed loads for the respective caissons. They came in 50-foot sections with milled ends, so that when they were connected by welded splice plates, perfect bearing over the entire core area was achieved.

Great care was exercised in setting the cores since they must be in exact alignment to receive the second-floor steel framework. Cuts were made into the top edge of the caissons with a hack-saw blade, and transits kept the big steel sections on line as they were lowered into position. For additional guidance, two plates, consisting of 15-inch channel sections, were tack-welded across the top of the caisson and bolted together, framing the core in precise positioning. These supports also aided the welders as they connected the core sections.

The tops of the steel cores were set to exact elevation. Then the caissons were unwatered with a 17-foot x 10-inch-diameter plunger pump lowered into the caisson within the beam flanges. The shell was then filled with 3,500-pound-strength-in-28-days concrete,

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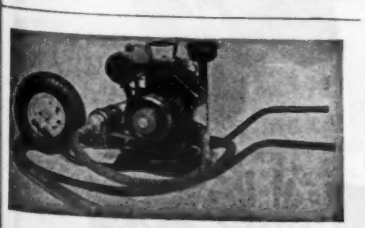

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Rex Moto-Mixers are the only truck-mixers that mix in the discharge direction so that the batch is always right up at the opening . . . ready to come out in a hurry the second the discharge is opened. There is no hesitation . . . no segregation. Deep spiral scoops get the batch out *fast.* Combine this exclusive high-speed discharge with the other outstanding Rex Moto-Mixer features . . . fast charge, Hi-Lo mixing, accurate water system, chain drum drive . . . and you'll see why you'll get more trips per truck per day.

For all the facts, see your Rex Distributor or write for Bulletin No. 46-8. Chain Belt Company, 1666 W. Bruce St., Milwaukee 4, Wis.

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REX

CONSTRUCTION MACHINERY

PUMPS PAVERS PUMPCRETES MOTO-MIXERS MIXERS

C. & E. M. Photo
A central receiver for compressed air was made by sealing up the ends of four lengths of caisson pipe with ⅞-inch steel plate, welded in place. An outlet ran into each receiver from the manifold in front of the caisson lengths.

Foundation Columns Are Anchored in Rock

(*Continued from preceding page*)

chuted into place from truck-mixers. Both grout and concrete were furnished by the Transit-Mix Concrete Corp. from its plant at East River Drive and 21st Street. After the concrete had set, steel billet plates 3 feet x 3 feet x 4 inches thick were placed on top of the steel cores, and held in place by 1⅛-inch anchor bolts. In addition, the underside of the billet plate was welded to the caisson shell.

The caissons were extended to a height of 20 feet above the ground, an unusual feature of a foundation job. But this eliminated lateral bracing and permitted clear floor spans with the greatest possible area for maneuvering and loading trucks.

Personnel

A force averaging 65, working a 40-hour week, was employed on the foundation for this plant, which will have a part-brick part-limestone front surrounding the steel framework. The total cost of the structure will be around $1,750,000.

Spencer, White & Prentis, Inc., was represented on the job by Daniel Barrows, Engineer, and Harry Armstrong, Superintendent. Joseph Weaver is General Superintendent and Harry T. Immerman is Chief Engineer for the firm.

Truck-Cleaning Manual Issued for Fleet Owners

A new illustrated manual on truck and motor cleaning and preventive maintenance has just been issued by The Magnus Chemical Co., Inc., Garwood, N. J. This 64-page manual, available from Dept. CEM, provides information on the latest methods and materials for cleaning, as recommended by Magnus.

The first part of the book deals with cleaning motors and chassis either by steam gun or by a cold solution of neutral, non-inflammable soap in liquid form; control and prevention of sludge; cleaning carburetors, and fuel and water pumps, with solvents of detergent action; and cleaning cooling systems and decarbonizing dismantled parts.

Another section serves as a guide in selecting the cleaning equipment for small, medium, or large shops. It covers the use of Kol-Dip tanks, Hot-Dip tanks, and agitating parts-cleaning equipment in a complete range of sizes with capacities from 20 pounds to a ton.

The second part of the book covers cleaning and deodorizing truck interiors, and stripping paint, lacquer, enamel, and japan from truck bodies and other equipment. It also discusses cleaning, whitening, and hardening concrete floors and driveways as another phase of cleaning in shops and garages, and offices, waiting rooms, rest rooms, and employee washrooms. It includes information on the cleaning and protection of hands.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 68.

Independent Expands Plant

A $1,000,000 expansion of its main plant has been announced by the Independent Pneumatic Tool Co., Chicago, maker of the Thor line of portable pneumatic and electric tools.

The expanded facilities adjacent to the company's main plant are planned for production of new Thor products, including electric saws, high-frequency electric tools, pneumatic hammers, valve refacers, and hard-seat grinders.

The building program is the latest major step of Thor expansion dur 1946, which saw the company's ch of factory branch offices extended twenty.

Engine-Starting Aid

A portable gasoline-driven generat designed as a starter-booster has b announced by the Homelite Corp., Riverdale Ave., Port Chester, N. Y. is said that this starter-booster gi the high cranking speed and stron spark necessary for starting in sub-ze weather. When connected to the ba tery terminals, the full capacity of t generator plus the current from t battery are fed into the starter.

Homelite starter-booster generato are available in sizes to fit all types applications, the manufacturer says, in cluding diesel trucks. They can al be used for quick charging of batteri

Further information may be secure from the company, or by using the en closed Request Card. Circle No. 2

Low WAA PRICES MEAN *Extra* PROFITS

The War Assets Administration is today the world's largest single supplier of valves and fittings. For instance, you can buy those hard-to-come-by valves and fittings for water, oil and steam lines from *any* WAA Regional Office and, more important, you can get delivery NOW. Prices are so low that extra profits are practically assured either on re-sales or installation jobs. Purchases must total $300 or more. All items offered subject to prior sale.

Valve sizes: ½" to 24"
Fittings sizes: ¼" to 36"
Pressure ranges: 100 lbs. p.s.i. to 3000 lbs. p.s.i.

While every Regional Office has a supply of valves and pipe fittings, the largest inventories are located in these cities:

Atlanta, Birmingham, Boston, Chicago, Cincinnati, San Francisco, Portland, Oregon, Nashville, Philadelphia, New York

All valves and fittings are sold under existing priority regulations of WAA and of the National Housing Expediter. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area, and then to purchase the materials offered herein.

EXPORTERS: Your business is solicited. If sales are conducted at various levels you will be considered as a wholesaler. Any inquiries regarding export control should be referred to Office of International Trade, Department of Commerce, Washington, D. C.

See our display booth at Western Metal Exposition and Congress Show at Oakland, California, March 22 to 27, 1947.

OFFICE OF GENERAL DISPOSAL
WAR ASSETS ADMINISTRATION
GOVERNMENT WAA SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Tulsa

827-3

VULCAN TOOLS

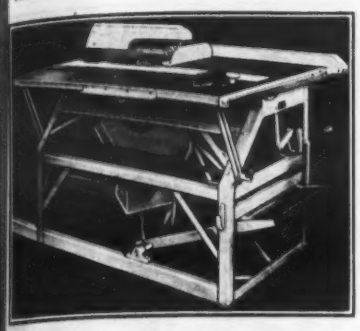
A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

Vulcan Tool Manufacturing Co.

35-43 Liberty Street, Quincy 7, Mass.

Branch Offices and Warehouse Stock:

New York 7, N. Y. 74 Murray St. — 34 No. Clinton St. Chicago 6, Ill.



This Bearcat XCO portable saw rig is one of four models made by The Paxson Co., designed for a variety of jobs.

Portable Saw Rigs Made in Four Models

Four models of Bearcat portable power saws are now in production by The Paxson Co. of Dowagiac, Mich. Two basic sizes are offered, each supplied in either a tilting-top or fixed-top model. For contractors and builders doing heavy construction work, Bearcat portable models XCO (tilting-top) and CO (fixed-top), with a saw diameter up to 24 inches, rip or cut off stock up to 9 inches thick. These two models require 5 to 20-hp motors or engines. Fabricated-steel table tops are 43 x 54 inches in size.

The smaller model XJR (tilting-top) and the JR (fixed-top) rip or cut off stock up to 4 inches thick. These units use 1½ to 8-hp motors or engines.

All four models have welded-steel angle frame and top construction, with channel-steel skids, combining portability from job to job with maximum strength and rigidity. The swing cut-off mechanism operates by foot-pressure on a broad pedal, which swings the saw through 14 inches horizontally. A special spring idler pulley is designed to maintain even tension of the belt, and constant power flow to the saw arbor. Arbor and idler pulleys are mounted on heavy-duty ball bearings. For ripping stock, a hand wheel locks the saw in any position.

The tilting-top models make a full range of square, angle, or bevel cuts up to 45 degrees. A special trunnion pivot on the table top keeps a constant gap between the throatboard and saw blade. This enables the sawing of narrow pieces when the top is tilted. The throatboard is removable to permit numerous dado combinations. A simple mechanism tilts and locks the top rigidly at any angle. With the fixed-top models, a tilting ripping fence permits bevel cuts up to 45 degrees.

All models have sawdust chutes and saw-blade guards. Standard equipment includes a ripping fence, adjustable cut-off fence, sliding mitre cut-off gage, arbor wrench, and two saw blades.

The Paxson Co. has recently built a new plant with expanded production facilities, and is currently enlarging its dealer organization.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 19.

Serves Galion in South

The appointment of John C. Painter as District Representative has been announced by The Galion Iron Works & Mfg. Co., manufacturer of rollers and motor graders. Mr. Painter will cover the states of North and South Carolina, Florida, and Georgia.

Dirt-Mover, Leveler Uses Eccentric Axle

A new machine for dirt-moving or automatic land leveling has been announced by the Eversman Mfg. Co., Curtis at 5th St., Denver, Colo. The Eversman leveler is not intended for large earth-moving jobs. It is designed for jobs in which a good-sized amount of dirt has to be moved, and then the land left level, as for airports, grass seeding, and similar jobs.

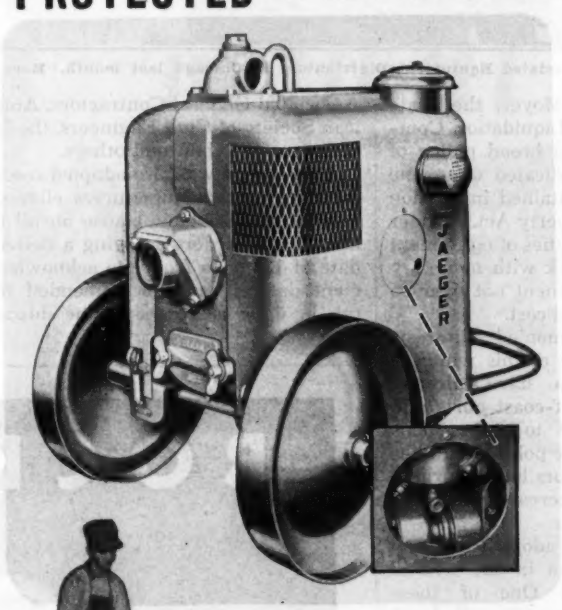
Made in two models of 2½ or 3½-cubic-yard capacities, it serves in its full length as an automatic land leveler, and, in a shortened form, as a dirt-mover. The cutting blade is 9 feet 3 inches long on both models. The cutting depth is 22 inches on the Model 25 HD, 28 inches on Model 35 HD.

The Eversman automatic land leveler is shown here in its shortened, or bobtail, form for use as a dirt-mover. It can handle from 2½ to 3½ cubic yards.

The grader blade is suspended on a movable sub-frame balanced with springs and connected to the wheels through an eccentric axle in such a way that when the wheels hit a high place, the blade automatically lowers to gather a load. When the wheels go into a low place, the blade rises to release enough dirt to fill, leaving enough extra dirt to allow for settling. The main frame is spliced just behind the cutting blade so that the long automatic leveler can be converted into a dirt-mover.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 20.

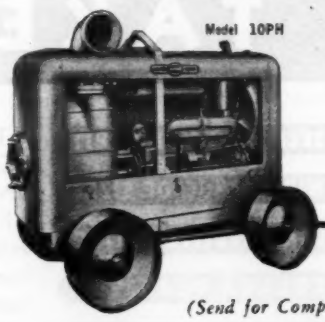
PROTECTED YET FULLY ACCESSIBLE



Instant-opening side panels. Enclosures also lift off or swing open for complete access.

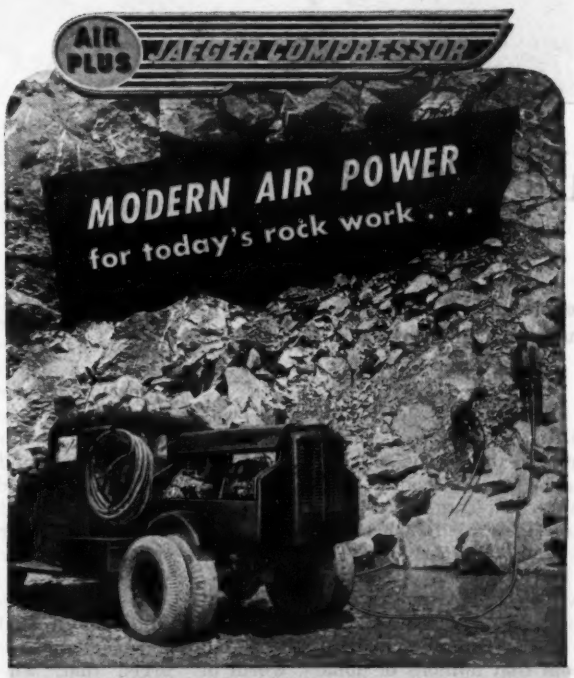
JAEGER
keeps the engine as efficient as the pump

These latest model Jaegers handle more water because they keep it from your sparkplugs, carburetor and the crankcase, insure a dry, quick-starting and efficient engine to match the efficiency and long life of your Jaeger "Sure Prime" pump. Enclosures on small pumps swiftly lift off when needed. On larger models the big Jaeger housing permits far easier accessibility to all engine parts. Add this to many other reasons why Jaeger outsells and out-performs all other pumps.



- More efficient power
- Inherent priming action plus "jet" priming — faster and doubly sure.
- Replaceable liners or seal rings in all sizes.
- All seals accessible for quick inspection.
- Micrometer workmanship.
- Certified performance.

(Send for Complete Catalog P-45.)



128 "AIR STATIONS" in U. S. and CANADA

SELL and SERVICE JAEGER COMPRESSORS

and the FINEST TOOLS to go with them.

Send for name of nearest distributor and catalog JC-5, the up-to-date buyers guide for compressors of 60 to 500 ft. size — trailer, truck or tractor-mounted.

THE JAEGER MACHINE COMPANY
701 Dublin Avenue, Columbus 16, Ohio — Distributors in 120 Cities

REGIONAL OFFICES: 8 E. 48th St. NEW YORK 17, N. Y. · 226 N. LaSalle St. CHICAGO 1, ILL. · 235-38 Martin Bldg. BIRMINGHAM 1, ALA.

TRANSITS and LEVELS
HEADQUARTERS for REPAIRS—any make

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalog CE-33 of Engineering Instruments, Engineering Field Equipment and Drafting Room supplies.

WARREN-KNIGHT CO.
Mfrs. of Sterling Transits & Levels
136 N. 12th St. · Philadelphia, Pa.

28TH ANNUAL CONVENTION
ASSOCIATED EQUIPMENT DISTRIBUTORS
EDGEWATER BEACH HOTEL, CHICAGO, FEBRUARY 13-15, 1947
PHOTOGRAPH BY CONTRACTORS AND ENGINEERS MONTHLY
EDGAR J. BUTTENHEIM, PUBLISHER

More than 1,700 attended the 28th Annual Convention of the Associated Equipment Distributors in Chicago last month. Here they are gathered for the annual luncheon.

AED Holds 28th Annual Convention

Resolutions Adopted to Solve Still-Numerous Reconversion Problems in Equipment Business

✦ DISPOSAL of surplus war goods was still a cause of concern to 1,775 delegates to the recent 28th Annual Meeting of the Associated Equipment Distributors. The convention was held at the Edgewater Beach Hotel in Chicago, February 13-15.

F. Gerald Moyer, Field Representative on the AED Committee on Disposal of Government Surplus, spoke to the assembled distributors. He told them that millions of dollars' worth of construction equipment, sold in foreign countries and insular possessions through a special directive, was likely to be dumped back on the United States market by speculators at greatly reduced prices.

According to Mr. Moyer, the State Department Foreign Liquidation Commission has adopted a broad policy of disposal overseas predicated upon one word—"feasible"—contained in Section 33 of the Surplus Property Act. Under this policy huge quantities of equipment have been sold in bulk with monetary return to the Government not over 25 per cent of the original cost.

Speculators and monied interests have taken advantage of this windfall, and many shiploads have already reached west and east-coast ports and are being sold direct to users. This "feasible approach", he pointed out, has already hurt distributors immeasurably and the impact will increase as surplus sales abroad accelerate.

Resolutions were adopted to aid equipment distributors in the overall construction picture. One of these urged that, where possible, Federal, state, county, and municipal organizations continue construction by the contract method, and award jobs to the lowest qualified responsible bidder. Another resolution pledged support to the apprentice-training program of the Associated General Contractors, American Society of Civil Engineers, the Department of Labor, and others.

A resolution was also adopted recommending that manufacturers eliminate at once the escalator clause on all acknowledged orders carrying a delivery date of 120 days from the acknowledgment date; it was recommended that this be done regardless of the shipping date.

New Officers Elected

William A. Danner, Parker-Danner Co., Hyde Park, Mass., was elected to the office of President for 1947. A. F. Garlinghouse of Garlinghouse Bros., Los Angeles, Calif., was elected Executive Vice President.

Other officers include Vice Presidents C. F. Halladay, Halladay-Dettman Co. of Sioux Falls, S. Dak.; H. L. Burleson,

(Concluded on next page)

CONCRETE EVIDENCE That a STOW Concrete Vibrator will save you . . .

TIME Very dry concrete, carrying a minimum of "water of lubrication" which "sets-up" quickly can be successfully placed in the forms. Result: forms can be "stripped" sooner, the work greatly stepped-up.

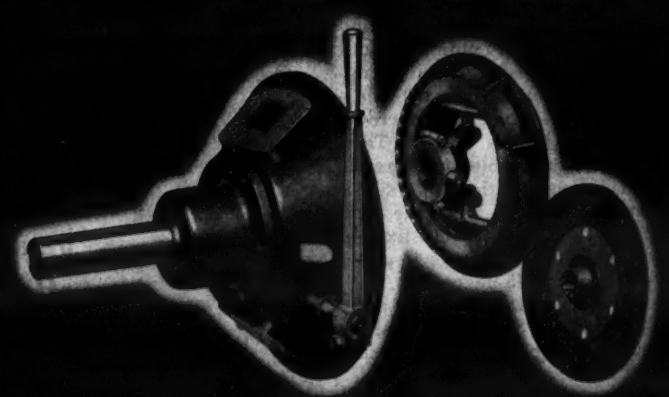
MONEY By using vibration, more aggregate can be used, less mortar required, to make a tight, dense concrete. When you save mortar you save cement, the most expensive ingredient in the mixture.

LABOR With a STOW Vibrator, one man can place as much concrete in the forms as four or five men using hand methods of puddling or spading.

For up-to-the-minute information on the latest developments in concrete vibrating equipment write for this free pamphlet . . .

STOW Manufacturing Co., 40 Shear St., Binghamton, N. Y.

ROCKFORD



POWER TAKE-OFFS

SELF CONTAINED UNIT
WIDE RANGE OF SIZES
CONSERVATIVE RATING
ROLLER BEARINGS
FINE ADJUSTMENT
ACCURATE BALANCE
S.A.E. DIMENSIONS

* The clutches used in ROCKFORD POWER TAKE-OFFS are carefully balanced to prevent centrifugal force from affecting efficient operation. A special machine checks the balance of each clutch * within extremely close limits, before it passes final inspection.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
314 Catherine Street, Rockford, Illinois, U.S.A.

AED Convention

(Continued from preceding page)

Browning-Ferris Machinery Co., of Dallas, Texas; Vincent J. Sheridan, Sheridan Equipment Co., Ltd., of Toronto, Ontario; and Treasurer Eldon M. Farnum, Allied Construction Equipment Co., St. Louis, Mo.

Regional directors include William A. Danner and Edward J. Crosby of Boston in Region 1; Harry J. Hush of New York in Region 2; George N. Crawford of Pittsburgh in Region 3; A. E. Finley of Raleigh, N. C., in Region 4; L. J. Moore of Atlanta in Region 5; J. Walker Wilson of Youngstown, Ohio, in Region 6; George W. Swart of Grand Rapids in Region 7; C. F. Halladay in Region 8; James W. Bell of Cedar Rapids, Iowa, in Region 9; H. L. Burleson in Region 10; A. F. Garlinghouse in Region 11; Fred M. Viles of Spokane in Region 12; Maxwell J. Lyons of Little Rock in Region 13; R. L. Arnold of Salt Lake City in Region 14; and Vincent J. Sheridan in Region 15. C. F. Winchester was reappointed Executive Secretary.

Important Topics Discussed

Delegates heard former member of Congress Roger C. Slaughter of Missouri speak on the labor and war-surplus problems. Mr. Slaughter pointed out that all delegates must take steps now to instruct representatives "on the hill".

H. E. Foreman, Managing Director of the Associated General Contractors of America, gave a picture of "Construction Problems as Seen by the Contractor". Pledging ever-greater cooperation between his organization and the AED, Mr. Foreman said the 1947 outlook for construction is a record-breaking dollar volume of activity, provided the problems which face the industries are solved successfully. He urged that construction costs be cut, that remaining Government regulations be lifted as speedily as possible, and that apprentices in construction be trained. He also pointed out the dangers of "day labor" and portal-to-portal pay.

Careful financing of construction equipment was discussed by Kenneth R. Wells, Assistant Vice President of the National Bank & Trust Co. of Chicago. Horace H. Hull, President of Hull-Dobbs Co., Memphis, Tenn., told the assembly how a program of incentive pay had proved successful in his firm.

"Road-Building Progress for 1947" was discussed by Charles M. Upham, Engineer-Director of the ARBA. He predicted that 1947 construction will top 1946 by about 50 per cent, that lumber and cement and trained engineers will still be scarce, but that the labor supply and per man production will be better.

Cummins Staff Changes

The promotion of two officials has been announced by the Cummins Engine Co., Inc., Columbus, Ind. V. E. McMullen is now Executive Vice President, and R. E. Huthsteiner is Vice President and General Manager.

Announced at the same time were the appointments of Leonard W. Beck as General Sales Manager and Waldo M. Harrison as Controller.

Sterling Products, Dealers Covered in New Catalog

A catalog describing its equipment and organization has been issued by the Sterling Machinery Corp., 405-13 Southwest Blvd., Kansas City 10, Mo. It is made up of reprints of full-page advertisements that have appeared in various trade magazines describing the Sterling line of pumps, hoists, and light plants.

The booklet contains a partial list of Sterling distributors, and other pertinent information about the Sterling products.

Copies of this literature may be obtained from the company. Or use the enclosed Red Request Card. Circle No. 64.

How to Stretch Your Cleaning Supplies

THERE'S no magic way, of course. But your nearby Oakite Technical Service Representative is prepared to show you supply-conserving techniques that may well tide you over today's shortage of cleaning compounds.

All you do is give him a call. He'll gladly stop in and review your cleaning procedures; make tests; recommend specialized Oakite techniques sure to make your cleaning supplies go further. His services and technical data on any phase of industrial cleaning — yours FREE without the slightest obligation.

OAKITE PRODUCTS, INC., 72 Thames St., NEW YORK 6, N.Y.
Technical Representatives in Principal Cities of U. S. & Canada

OAKITE REG. U. S. PAT. OFF.

MATERIALS
METHODS
SERVICE

Specialized Industrial Cleaning

HIGH Concrete Pouring in TIGHT SPOTS

with the MULTIFOOTE *Elevating Boom* PAVER!

MultiFoote 34-E reaching over footings to pour footing caps on a new building foundation. Travel in tight spots and putting concrete where it's needed in big volume is a MultiFoote Elevating Boom Paver specialty.

Pouring full loads up to 18½ feet above ground level . . . maneuvering in tight spots . . . operating fast and easily on jobs *impossible* for most concrete pavers is routine for MultiFoote Elevating Boom Pavers. This is a concrete paver that can do a real job on all types of concrete construction work, as well as on straightaway paving . . . A machine that is big enough for the big jobs; and so economical in operation that small jobs are profitable, too.

The MultiFoote Elevating Boom is built for continuous operation on high pouring. Oversize clutches and brakes and special hoist transmission make this unit as dependable in use as the rest of the simple rugged MultiFoote Paver features.

Get full details from your MultiFoote Dealer—or write direct. Remember: *MultiFoote Elevating Boom Pavers are the only pavers built for continuous high pouring service.*

THE FOOTE COMPANY, INC.
1916 State Street
Nunda, New York

MULTIFOOTE
CONCRETE PAVERS

This Cedarapids asphalt plant, powered by International diesel engines, is owned by the Towles-Cline Construction Co. of Wilmington, N.C. It has served a number of road-improvement projects within a radius of 20 miles.

Employer Accrediting Urged for Engineers

Accrediting employers is advocated for the engineering profession in an article in the January issue of *Civil Engineering*, publication of the American Society of Civil Engineers. Author of the article is Frederick H. McDonald of Charleston, S. C. By agreeing upon standards of performance for employers and employees, he feels many labor-management problems will be eased. These standards will protect the employer and employee as long as each maintains them.

Just as educational institutions are now accredited for scholastic standards, employers should be accredited as to standards of duties, salaries, and working conditions for all technical positions. Mr. McDonald feels that engineers should institute this system just as they have long exercised the privilege of setting up and maintaining their own standards for the education of engineering students. He states in his article, "With the recognition of accredited employers, those who were unaccredited would suffer the stigma now attached to unaccredited colleges."

The American Society of Civil Engineers plans a presentation before the 80th Congress, during the hearings which are expected to be held in the process of realigning the nation's labor laws. The Society has adopted a labor policy which recognizes the principle of collective bargaining. But it asks freedom for professional men to form bargaining units comprised exclusively of professional men, and only when they choose to do so.

Seepage-Type Hose Wets Down Concrete

A new type of hose for use in wetting down concrete during the curing period has been announced by the B. F. Goodrich Co., Akron, Ohio. The new Oozer hose does not spray. It has a special patented construction which allows the water to seep out gently and continuously along its length.

The hose is made of heavy duck specially treated to permit water to ooze from every pore at a uniform rate throughout its entire length, the manufacturer points out. Each unit is equipped with a brass coupling with washer, rubber hose ferrule, and Punch-Lok clamp. The hose comes in 12, 18, 30, and 50-foot lengths, 2½ inches in diameter. The water flow can be adjusted to the proper speed for curing concrete, the manufacturer says.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 43.

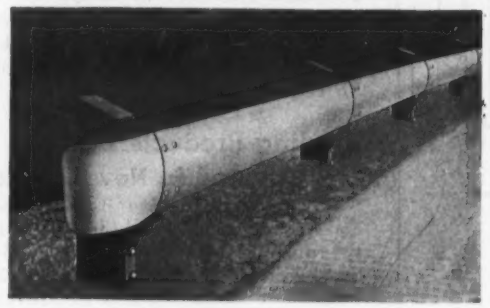
New York Contractors Elect Officers for 1947

Officers for The General Contractors Association of New York were elected at a recent luncheon meeting. President for 1947 will be John A. Reilly, Vice President of the Arundel Corp. J. Rich Steers, Jr., will serve as First Vice President, and Joseph Meehan, Second Vice President.

The following members were elected to serve on the Executive Committee until the Annual Meeting in 1949: The Arundel Corp., The Arthur A. Johnson Corp., Geo. M. Brewster & Son, Inc., Johnson, Drake & Piper, Inc., The Robbins-Ripley Co., Spearin, Preston & Burrows, Inc., and Geo. W. Rogers Construction Corp.

Export Division in N. Y. C.

The elevation of its Export Department to full division status, under the managership of Paul E. Fulford, has been announced by R. G. LeTourneau, Inc., Peoria. Office space for the Export Division has been secured in New York City, and will soon be occupied.



High Visibility Low Upkeep
TUTHILL GUARDS
Insure Better Safer Highways

HIGH VISIBILITY, due to convex surface, makes TUTHILL the safer Guard. Seen quicker, warns of danger, is struck less, reduces number of accidents. Spring-bracket supported rails are flexible, yet strong, under impact; deflect cars back into highway, prevent serious damage and undue loss of life. Make TUTHILL, the *better* Guard Rail, your choice. REQUEST DETAILS.

Pacific Coast Manufacturers and Distributors: U.S. SPRING & BUMPER CO., Los Angeles, Calif.

TUTHILL SPRING COMPANY
762 W. POLK ST., CHICAGO 7, ILL.

For FASTER PAVING *with* MINIMUM TRAFFIC DISRUPTION

Bitucote PRE-MIX

The emulsified asphalt for mixing with a combination of aggregates to desired gradation. Ideal coating of all particles, attained in batch mixing, provides ideal, stable paving. Hauled to job and spread . . . minimum handling — no heating apparatus required. Quickly cures for rolling — traffic is then resumed immediately.

BITUCOTE provides a permanently stable base and non-skid, non-corrugating wear course — crack-resistant, ductile and non-softening.

BITUCOTE is cold mixed — no fire hazard — Asphalt in its most usable form.

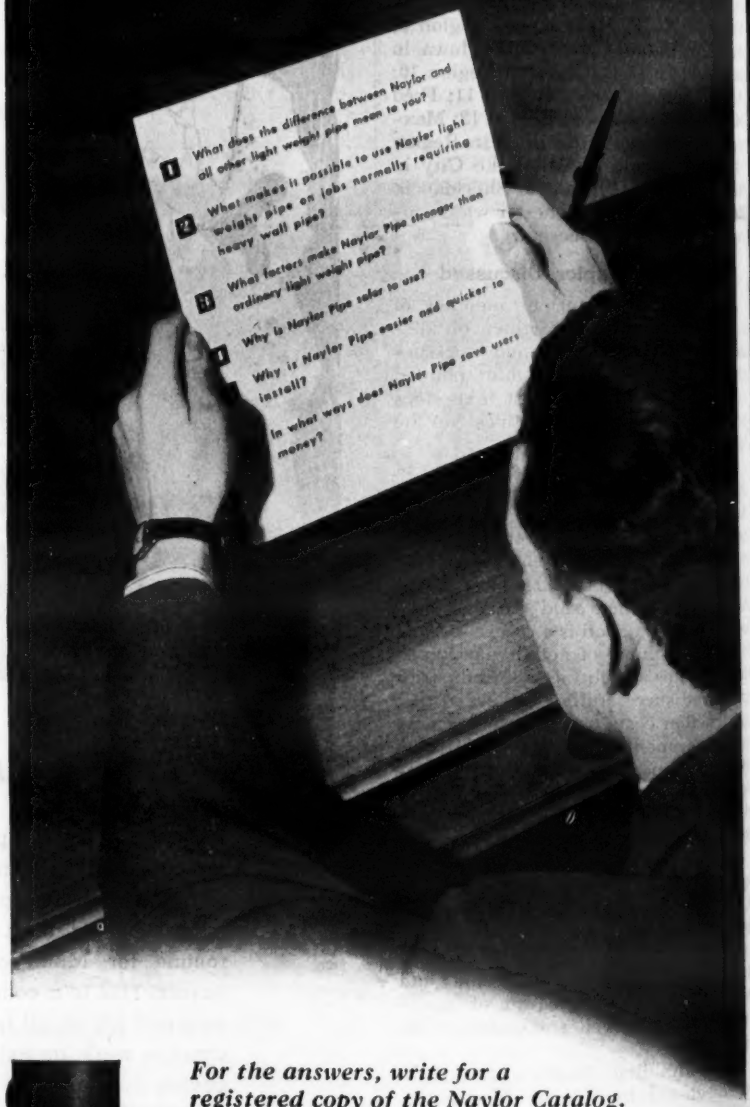
Bitucote PRODUCTS CO.

Write for booklet—
"Pave It Better With Bitucote"

CAMDEN, N. J. • CINCINNATI, OHIO
ELDORADO, ARK. • ST. LOUIS, MO.

1414 Central Industrial Drive
St. Louis 10, Mo.

You'll be Money Ahead to Know the Answers


1 What does the difference between Naylor and all other light weight pipe mean to you?
2 What makes it possible to use Naylor light weight pipe on jobs normally requiring heavy wall pipe?
3 What factors make Naylor Pipe stronger than ordinary light weight pipe?
4 Why is Naylor Pipe safer to use?
5 Why is Naylor Pipe easier and quicker to install?
6 In what ways does Naylor Pipe save users money?

For the answers, write for a registered copy of the Naylor Catalog.

Naylor

NAYLOR PIPE COMPANY
1270 East 92nd Street • Chicago 19, Illinois
New York Office: 350 Madison Avenue • New York 17, N. Y.

Better Compaction Is Possible on Fills

(*Continued from page 2*)

square.

Naturally the first question to come up was how much density did the officer want, and what would determine this "satisfactory degree of compaction". After some time the answer came. "We want 100 per cent in the top 6 inches!" Since most of the embankment was comparatively shallow, it was safe to assume they wanted 100 per cent at least in the upper 3 feet.

The pre-conditioning equipment on this job was the old, commonly used scarifier. From 7 to 9 passes were required by the inspectors, and each one was like pulling teeth. Early in the job a trial run was made. After 7 passes with the scarifier, the 100-ton pneumatic roller made four passes. Densities ranged from 89 to 94 per cent. The same area was re-scarified, reconditioned, and re-rolled. This time the rolling was increased to 12 passes. The densities were 92 per cent, still poor.

This same procedure was increased progressively to 20 passes with the 100-ton pneumatic roller, eliminating the sheepsfoot which had alternated in the second test. The method of processing was 7 passes with the water wagon and 8 passes with the scarifier. The necessity of 7 passes with a water wagon to add 9 or 10 per cent of moisture may cause a few raised eyebrows, but the answer was simple, particularly in clay and silt at Santa Monica. If too much water had been added at once, it would have created saturated pockets; this is a condition the scarifier is powerless to correct because it lacks the ability to turn, mix, blend, and distribute this surplus moisture through the drier parts of the lift.

The 92 per cent result was a far cry from the 100 per cent that had been specified. Friction developed. The advice of high district authority was requested by the resident engineer and a conference was held. There was some discussion about removing the soil 3 feet below the existing grade, wasting the material, and importing new dirt.

Fed up with the continual quarrel, the contractor had purchased a Seaman Pulvi-Mixer that very day, and was awaiting delivery that afternoon. The resident engineer was convinced that the improvement of moisture distribution would correct the trouble; it was on this very point that so much friction had developed. So he suggested that all experiments or design changes be held in abeyance until the new machine had been tried.

Repeated and expensive trips with a tank truck are unnecessary if the number of passes required for proper processing of the fill material can be cut down.

They brought the Pulvi-Mixer out in a small trailer. They made one trip with the water wagon and put all 9 per cent of moisture in the lift at once. After one pass with the Seaman machine, the moisture distribution was so good that the resident engineer reached down, picked himself up a handful of the homogeneous mixture, and said to the superintendent, "that's the way I've been trying to tell you it should look".

After this conditioning, the ground was compacted by 16 passes over the same area with the sheepsfoot and pneumatic rollers. In sampling the results, densities were taken at 100-foot intervals after the first lane was completely rolled. They proved conclusively that moisture distribution had been the trouble, for results showed densities of 98.5 per cent of maximum compared to the previous low 92. They proved that processing for uniform moisture distribution was the step which would insure the desired results.

In the five months it took to finish this job, densities behind the Seaman machine never dropped below 98.5 and many 100 per cent samples were taken and recorded.

This is not necessarily a cure-all for all compaction trouble. But on this job it certainly solved the problem of distribution of moisture successfully and it proved how important that forgotten phase of embankment building can be.

In viewing or analyzing the results of this test case, some consideration must be given to the added help of the sheepsfoot roller; however, it seems reasonable to assume the improvement would have been negligible without uniform moisture blending. Also remember that the combination of the two rollers failed in the previous part of the job when the Pulvi-Mixer was not used.

Apart from the results, consider the economics of this job. Here was a Government agency, paying public money at the rate of a nickel per 100 square feet for 12 passes, and ending up with rejectable fill. The agency would have paid for 16 passes, without obtaining the proper result.

A few days after the Pulvi-Mixer made its debut, the roller passes were reduced from 16 to 12, and then to 8. Density reports showed a very insignificant drop in the degree of compaction, and readings held to 98.5 and above. So it was apparent that the last method of processing and rolling could not be improved on much, if at all, and the job was finished in that fashion.

The contractor and the agency had reduced earth processing from 8 passes with the scarifier to one with the Pulvi-Mixer. They had cut the number of water-wagon trips by more than half. They had reduced 100-ton pneumatic

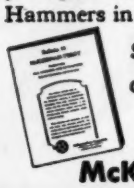
(*Concluded on next page*)

McKiernan-Terry

DOUBLE-ACTING PILE HAMMERS

used 'round the world

Long before the late war these pioneer double-acting pile hammers were the choice for major construction projects as far away as the Orient, Australia, India, as well as Europe and the Americas. Throughout the war, these hammers gave needed aid to Army and Navy construction and reconstruction forces in every theatre of operation . . . . Today, the greatly expanded facilities of two large, modern McKiernan-Terry manufacturing plants offer contractors prompt deliveries of McKiernan-Terry Double-Acting Pile Hammers in ten standard sizes.



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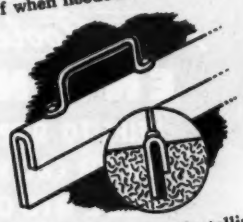
Keystone dummy joints can be used transversally or longitudinally. Designed to give maximum rigidity, are absolutely waterproof, low in cost and easy to handle. Shipped in flat sheets at job specified lengths, sheets are scored at specified widths and are simply broken off when needed.



Dummy Joint Installing Channel — This 12 gauge steel "U" shaped strip simplifies and speeds the installation of Keystone Dummy Joint. Made in lengths to match the joint and just wide enough to receive the joint and still withdraw freely.

Dummy Strip is easily broken off and carried out on bridge over wet cement for installation.

Accurate alignment is easily obtained when joint and installing channel are pressed into cement.

Steel installing channel is withdrawn leaving joint imbedded in concrete. Process is repeated.

Ask about the NEW KEYSTONE EQUIPMENT LINE

KEYSTONE offers contractors a joint slitting machine, concrete curing compound spray machines and rubber asphalt joint sealing compound kettles at accepted manufacturer's prices. Write or wire.

KAP

KEYSTONE ASPHALT PRODUCTS COMPANY

A Division of the American-Marietta Company

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When a roller goes to work on a properly processed embankment, all its work is directed towards compaction of the dirt. No effort need be wasted in breaking up clods.

Better Compaction Is Possible on Fills

(*Continued from preceding page*)

and sheepsfoot-roller passes from 20 to 8 passes of each, effecting a saving of $0.60 per square. They had increased their densities from 92 to an average of 98.5 per cent of maximum. *And they had speeded up the job!*

Lessons Must Be Used

Engineers or contractors who have not actually faced these problems in the field may contend that this trouble with proper compaction is only an isolated case, that most dirt issues are easily met, and that water can be added at the pit.

There are several reasons why the application of all the moisture at the borrow pit is unsatisfactory. Seldom is the natural moisture in the soil uniform. And most of the time the distribution of added water is uneven. Even assuming that this were not so, and the earth left the borrow pit with just the proper amount of moisture on every particle, what do you suppose would happen on almost any sunny, windy day when this dirt was dumped and spread in a 6-inch lift over a large area? Long before the roller arrived it would have lost much of its pit-applied water. So it is not long in a "dirt stiff's" life before he gives up the idea of pit-applied water and turns to including it in his processing.

Simple, isn't it? But these easy rules have yet to be written into many a construction specification. When they are, contractors will be relieved of guesswork, they will be able to estimate processing costs more accurately, and the unit price of fill will drop. Future dirt specifications should call for: (1) pay for water at a separate unit price, preferably in thousand-gallon increments, (2) clear rules on the processing of soil by specified and approved equipment, (3) approved rollers by type *and* weight, (4) density requirements sufficiently high to take advantage of the improved and consistent results that are certain to follow.

The job so protected by intelligent specifications will rid itself forever of compaction failures, poor moisture distribution, unnecessary and expensive rolling, slow progress, poor stability, post-construction legal claims, and bad on-the-job relations while the dirt is flying.

And just in case I hear the voices of a few readers saying, "But we really don't need that high a degree of compaction," let me reply: "Don't you? Be honest, mister."

Highway Safety Director

The North Carolina State Highway and Public Works Commission has created a new office of Safety Director and appointed J. P. Dodge to the post.

The Director is a veteran employee of the Commission, having a record of more than twenty years previous service in the right-of-way and claims department. He has only recently been discharged from the U. S. Army where he served the past six years, holding the rank of major.

He is now organizing his new department. Its primary function is to develop and place in effect a sound and practical safety program designed to protect the personnel of the Highway Commission, including workers on roads, bridges, and at state-owned quarries, as well as on the farms and prisons which are under the jurisdiction of the Commission. The media for spreading information on safety will include recognized methods of accident reporting, analysis, and experience rating.

School for Dealers

With the prospect of increased production and a need for personnel trained in present-day construction equipment, the Koehring Co. of Milwaukee is holding dealer-training courses. These are designed to supply its distributor salesmen with complete and up-to-date information on Koehring products.

The February 10-day refresher course was attended by new men in the field as well as by experienced men. It was under the direction of Arthur E. Loder, and lectures were given by key members of the sales, engineering, and management staffs, with ample discussion and question-and-answer periods.

Additional schools for sales and service personnel are being planned throughout the year.

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Wellman pioneered welded rolled steel construction for longer life and greater service. It's the extra strength that gives the extra, low-cost digging power. Whatever your requirements . . . whether for Multiple Rope, Power Arm, Dragline, Power Wheel or Special Service—specify Wellman! ⅜ to 16½ yd. capacity.
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This single cylinder heavy-duty Wisconsin Air-Cooled Engine is operating a H-42-DG, Type 30 Ingersoll-Rand Air Compressor which furnishes starting air for the XVO Compressor Unit on the C & O Railroad's Blue Ridge Tunnel Job, near Afton, Virginia . . . handled by contractors Bates & Rogers, Chicago.

This is just another run-of-the-mill Wisconsin Air-Cooled Engine construction service application . . . typical of the many heavy-duty power jobs entrusted to these tough, hard-hitting engines on a great variety of equipment in many fields. Wisconsin Air-Cooled Engines are supplied in 4-cycle single cylinder and 4-cylinder V-type models in a power range of 2 to 30 hp.

Specify "WISCONSIN" for utmost dependability and heavy-duty serviceability.

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World's Largest Builders of Heavy Duty Air-Cooled Engines

. . . are made in suitable types and sizes to insure reliable operation under all kinds of working conditions

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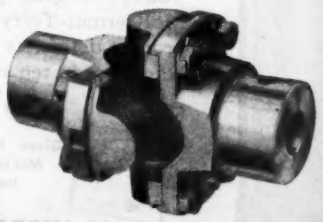
Because MECHANICS Roller Bearing UNIVERSAL JOINTS require only once-a-season lubrication, frequent stops for this purpose are unnecessary. Operators of machines that must run continuously day-after day are learning to insist on this feature.

Let our engineers show you how this infrequent lubrication and other advantages of MECHANICS Roller Bearing UNIVERSAL JOINTS will help keep your machines working more hours per day and more days per year.



MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner • 2026 Harrison Ave., Rockford, Ill.

This Baker bulldozer was designed specially for the Allis-Chalmers HD-5 tractor. Some of its features are direct down pressure, rolling blade action, and fast blade control.

Dozer to Fit Tractor

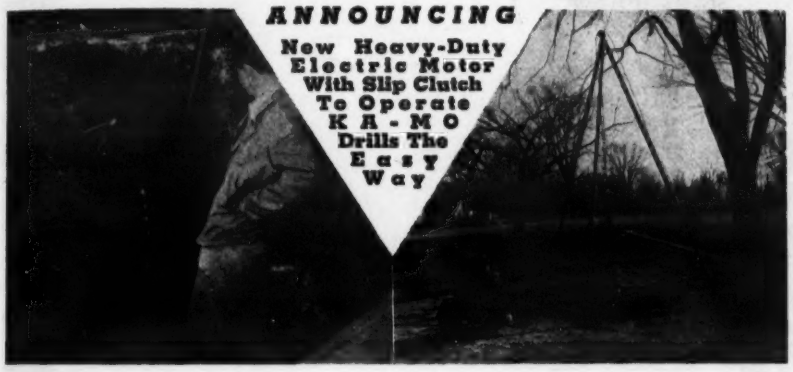
Bulldozers and gradebuilders engineered especially for the Allis-Chalmers HD-5 tractor have been developed by the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill. These dozers are designed to match the tractor power, size, and speed of the 2-cycle diesel-powered HD-5. They feature direct down pressure, a low-pressure hydraulic system, less linkage, fast blade control, and rolling blade action.

The HD-5 is a new small tractor with big tractor design, its manufacturer says. Its features are listed as a drawbar pull of 37.4 hp, with five speeds from 1.46 to 5.47 mph; 1,000-hour roller and idler lubrication; full visibility for the operator; and simplified maintenance.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 40.

Cleveland Office Opened

The opening of a consolidated office in Cleveland has been announced by Raybestos-Manhattan, Inc. Several divisions of the organization will be represented there, and other Cleveland divisional offices have also been combined in this office. It is located at 1071 Union Commerce Bldg., Cleveland 14, Ohio.



The NEW HEAVY-DUTY MOTORS have considerable more power, stronger built with heavy gears and slip clutch between the motor and drill.

Not too heavy to carry and use in the out-of-the-way places.

Designed for fast easy work in mud, sand or clay, handles KA-MO equipment the easy way. With our light tripod, a new piece of equipment which folds into one bundle and of new design you can drill and test soil conditions.

Drills under streets, alleys, highways, and railroads for gas, water and sewer mains. Holes up to 16 inches in diameter.

Our patented KM Drills are operated by either air or electric motors.

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Our equipment is not a one-purpose tool.

A piece of equipment used for telephone, telegraph, power, REA work and drilling elevator shafts in buildings.

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